3. i'zu&i=k gy djusdk le; rhu (3) ?k.Vs gksxkA

ç'ui=k&fuekZ.k dsfy;sfunZs'k%&

1. ç'ui=k esa dqy ikap (5) ç'u fn;s tk,¡A ç'ui=k dsfy;s dqy 120 vÄïfu/kZfjr gSaA lHkh ç'u lekukÄï gksaxsvFkkZ~ çR;sd ç'u pkSchl (24) vÄïksa dk gksxkA i'zu&i=k gy djusdk le; rhu (3) ?k.Vs gksxkA
2. çFke ç'u ikB~ÔØe dspkjksa ?kVdksa esa fu/kkZfjr fo"k;ksa dsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okysfodYi jfgr vkB (8) ç'u iwNs tk,¡A çR;sd y?kqÙkjh; ç'u rhu (3) vÄïksa dk gksxkA
3. f}rh;] r`rh;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikB~ÔØe dsØe'k% çFke] f}rh;] r`rh; rFkk prqFkZ ?kVd esa fu/kkZfjr fo"k; dsvk/kkj ij fd;k tk,A ikB~ÔØe dsçR;sd ?kVd lsnksoSdfYid ç'u nsdj ijh{kkFkhZ lsçR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kusdks dgk tk,A

OR

DSE-Sanskrit-4

<u>BH-SKT-608 - MOOC FROM SWAYAM PORTAL</u>

CO, PO, PSO MATRIX (MAPPING) B.A HONOURS

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-101 CO	3	3	2.75	2.75	2.75	3	2.75	3	3	3	3	2.5
BH-SKT-102 CO	3	2.75	3	2	3	3	2.5	3	3	3	2.75	2.5
BH-SKT-201 CO	3	2.75	3	2.15	3	2.75	2.5	3	2.75	3	2.75	2.5
BH-SKT-202 CO	3	3	2.75	2.5	3	2.5	3	3	2.75	3	2.75	2.75

B.A HONOURS CO, PSO MAPPING MATRIX
SEMESTER I

	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-101 CO-1	3	3	3	3
CO-2	3	3	3	3
CO-3	3	3	3	3
CO-4	3	3	3	2
AVG	3	3	3	2.5

	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-102 CO-1	3	3	3	2
CO-2	3	3	3	3
CO-3	3	3	2	2
CO-4	3	3	3	3
AVG	3	3	2.75	2.5

B.A HONOURS CO, PSO MAPPING MATRIX
SEMESTER II

	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-201 CO-1	3	3	3	3
CO-2	2	3	3	2
CO-3	3	3	3	3
CO-4	3	3	2	2
AVG	2.75	3	2.75	2.5

	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-202 CO-1	3	3	3	2
CO-2	3	3	2	2
CO-3	3	3	2	2
CO-4	2	3	3	3
AVG	2.75	3	2.75	2.75

CO, PO, MAPPING MATRIX B.A HONOURS

SEMESTER I

BH-SKT-201	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	3	3	3	3	3	3	2	3
CO-2	3	3	2	3	3	3	3	3
CO-3	3	3	3	2	3	3	3	3
C0-4	3	3	3	3	2	3	3	3
AVG	3	3	2.75	2.75	2.75	3	2.75	3

BH-SKT-202	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	3	3	3	2	3	3	3	3
CO-2	3	3	3	2	3	3	2	3
CO-3	3	2	3	2	3	3	2	3
C0-4	3	2	3	2	3	3	3	3
AVG	3	2.5	3	2	3	3	2.5	3

CO, PO, MAPPING MATRIX B.A HONOURS

SEMESTER II

BH-SKT-201	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	3	3	3	2	3	3	2	3
CO-2	3	3	3	2	3	2	3	3
CO-3	3	2	3	3	3	3	3	3
C0-4	3	3	3	2	3	3	2	3
AVG	3	2.75	3	2.15	3	2.75	2.5	3

BH-SKT-202	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	3	3	3	2	3	3	3	3
CO-2	3	3	3	2	3	3	3	3
CO-3	3	3	3	3	3	2	3	3
C0-4	3	3	2	3	3	2	3	3
AVG	3	3	2.75	2.5	3	2.5	3	3

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Kurukshetra University, Kurukshetra

Department of Sanskrit, Pali & Prakrit

Scheme of Examination and Syllabus

B.A Sanskrit Elective Semester I – VI

Under CBCS W.E.F Academic Session 2020-2021
(In Phased Manner)

Semester I

Sr. No.	Course	Course Type	Nomenclature	Credits	Tutorial per Week	Teaching Hours per Week	internal Marks	External Marks	Maximum Marks	Duration of Exam (Hours)
1.	English-101	Core		6	1	5	30	120	150	3 Hours
2.	Hindi-101	Core		6	1	5	30	120	150	3 Hours
3.	Subject-I Sanskrit B-SKT-101	Core	uhfr lkgR; ,oa Oksdj.k	6	1	5	30	120	150	3 Hours
4.	Elective Subject-2	Core		6	1	5	30	120	150	3 Hours
5.	(English/MIL Communication) /Environmental Studies	AECC-2		2		2	10	40	50	3 Hours
	Total			26	4	22	130	520	650	

Semester II

Sr. No.	Course	Course Type	Nomenclature	Cred its	Tutorial per Week	Teaching Hours per Week	internal Marks	External Marks	Maximum Marks	Duration of Exam (Hours)
6.	English-201	Core		6	1	5	30	120	150	3 Hours
7.	Hindi-201	Core		6	1	5	30	120	150	3 Hours
8.	Subject-I Sanskrit B-SKT-201	Core	JhenHkkxorxhrk] LoLFkoÙk ,oa O;kdj.k	6	1	5	30	120	150	3 Hours
9.	Elective Subject-2	Core		6	1	5	30	120	150	3 Hours
10.	(English/MIL Communication) /Environmental Studies	AECC-2		2		2	10	40	50	3 Hours
	Total			26	4	22	130	520	650	

Semester III

Sr. No.	Course	Course Type	Nomenclature	Credits	Tutorial per Week	Teaching Hours per Week	internal Marks	External Marks	Maximum Marks	Duration of Exam (Hours)
11.	English-301	Core		6	1	5	30	120	150	3 Hours
12.	Hindi-301	Core		6	1	5	30	120	150	3 Hours
13.	Subject-I Sanskrit B-SKT-301	Core	,sfrgkfld egkdkO; ,oa O;kdj.k	6	1	5	30	120	150	3 Hours
14.	Elective Subject-2	Core		6	1	5	30	120	150	3 Hours
15.	SEC-1 Computer Science/Personality Development/ MOOC/Sanskrit	SEC-1	iz;ksxkRed laLÑr	2		2	10	40	50	3 Hours
	Total			26	4	22	130	520	650	

Semester IV

Sr. No.	Course	Course Type	Nomenclature	Credits	Tutorial per Week	Teaching Hours per Week	internal Marks	External Marks	Maximum Marks	Duration of Exam (Hours)
16.	English-401	Core		6	1	5	30	120	150	3 Hours
17.	Hindi-401	Core		6	1	5	30	120	150	3 Hours
18.	Subject-I Sanskrit B-SKT-401	Core	egkdkO;] miU;k ,oa O;kdj.k	6	1	5	30	120	150	3 Hours
19.	Elective Subject-2	Core		6	1	5	30	120	150	3 Hours
20.	SEC-2 Computer Science/Personality Development/MOOC /Sanskrit	SEC-2		2		2	10	40	50	3 Hours
	Total			26	4	22	130	520	650	

Semester V

Sr. No.	Course	Course Type	Nomenclature	Credits	Tutorial per Week	Teaching Hours per Week	internal Marks	External Marks	Maximum Marks	Duration of Exam (Hours)
21.	DSE-Sanskrit-I B-SKT-501	DSE-I	CkSd lkfgR;] ukVd ,oa O;kdj.k	6	1	5	30	120	150	3 Hours
22.	DSE B-SKT-502 or B-SKT-503 or B-SKT-504	DSE-I	/eZ laŇfr ,oa n'kZu or Hkkjrh; ifjis{; esa O;fDrRo fodkl or MOOC from Swayam Portal	6	1	5	30	120	150	3 Hours
23.	Skill enhancement Course-2 B-SKT-505	SEC-3	Hkk'kk fOkKku ds eyw fl ¼kar	2		2	10	40	50	3 Hours
24.	Generic Elective	GE-I		6	1	5	30	120	150	3 Hours
	Total			20	3	17	100	400	500	

Semester VI

Sr. No.	Course	Course Type	Nomenclature	Credits	Tutorial per Week	Teaching Hours per Week	internal Marks	External Marks	Maximum Marks	Duration of Exam (Hours)
25.	DSE-Sanskrit-2 B-SKT-601	DSE-2	ukVd] ykfSd I kfgR; , oaO;kdj.k	6	1	5	30	120	150	3 Hours
26.	DSE-2 B-SKT-602 or B-SKT-603 or B-SKT-604	DSE-2	I aÑr I kfgR; esa uhfr , oa vkpkj or I aÑr I kfgR; esa jk"Vªokn or MOOC from Swayam Portal	6	1	5	30	120	150	3 Hours
27.	Skill enhancement Course-2 B-SKT-605 or B-SKT-606	SEC-4	I aÑr p; fudk&1 or I ady r thou i ¼fr	2		2	10	40	50	3 Hours
28.	Generic Elective	GE-I		6	1	5	30	120	150	3 Hours
	Total			20	3	17	100	400	500	

B.A General :- **Total Teaching Hours-22+22+22+22+22+17+17 = 122**

Total Marks=650+650+650+650+500+500 = 3600

Total Credits = 144

Programme Outcomes (PO) of Bachelor of Arts (General)
CBCS Programmes/Courses in the Institute of Integrated and Honours Studies, Kurukshetra University, Kurukshetra

PO 1: Demonstrate a detailed knowledge and understanding of selected fields of study in core disciplines in the humanities, social sciences and languages;

PO 2: Apply critical and analytical skills and methods to the identification and resolution of problems within complex changing social contexts.

PO 3: Demonstrate a general understanding of the concepts and principles of selected areas of study outside core disciplines of the humanities, social sciences and languages;

PO 4: Apply an independent approach to knowledge that uses rigorous methods of inquiry and appropriate theories;

PO 5: Articulate the relationship between diverse forms of knowledge and the social, historical and cultural contexts that produced them;

PO 6: Communicate effectively and show ability to read, write, listen to and speak in a chosen language/s with fluency;

PO 7: Act as informed and critically discerning participants within the community of scholars, as citizens and in the work force;

PO 8: Work with independence, self-reflection and creativity to meet goals and challenges in the workplace and personal life.

PSOs of B.A Sanskrit Elective

1. laLÑr Hkk"kk ,oa lkfgR; dk ifjp;
2. laLÑr O;kdj.k ,oa vuqokn ds }kjk Hkk"kk dkS'ky dk fodkl
3. laLÑr x| &i| ,oa ukVd dsv è;;u }kjk Hkkjrh; laLÑfr ,oa dyk dk Kku
4. uhfr] /eZ ,oa n'kZu dsv è;;u }kjk O;ogkfjd ,oa O;kolkf;d dkS'ky

KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Examination for B.A. Part-I in the Subject of Sanskrit (Elective) (Semester System)

B.A. Part-I
First Semester

w.e.f. Session : 2020-2021

SANSKRIT (ELECTIVE)

B-SKT-101, Paper – I : uhfr lkfgR; ,o 0;kdj.k

Credits = 6 iw.kkZad%100

vkUrfjd ewY;kadu%30

le;% 3 ?kaVs

CO-101-1 lLÑr Hkk"kk e Kku dh ljy eukoKkfud fof/k;k d }kjk Nk=k dk ck/k djku d fy, vud xFk dgkuh d :i e fy[k x, tl ipr=] fgrkin'k vkfn A bl ?kVd e fgrkin'k d fe=ykHk idj.k l Nk=k dk lLÑr Hkk"kk e io'k djok;k tkrk gA

CO-101-2 uhfr'krd Hkkjrh; uhfr'kkL= rFkk lHkkf"kr d :i e tkuk tkrk gA Hkrgfj }kjk jfpr uhfr&'krd d iFke 50 'yksdk d ek/;e l Nk=k dk U;k; ,o uhfr l lekt ck/k dh f'k{kk nu dk i;kl fd;k x;k g A

CO-101-3 lLÑr Hkk"kk e io'k d fy, Nk=k dk 0;kdj.k d iFke lkiku /kkr:i rFkk 'kCn:ik dk Kku gkuk vko';d gA bl ?kVd e Nk=k dk ljy /kkr&:ik l ifjp; djok;k tkrk g rkfd o lLÑr Hkk"kk le>u e rRij gk ld A

CO-101-4 Hkk"kk e lf/k;k dk i;kx ije vko';d gA bl ?kVd e Nk=k dk lLÑr Hkk"kk dh lf/k;k dk ck/k djok;k tkrk g rkfd o Hkk"kk dk vkIkuh l le> ld D;kfd lf/k e ink dk vyx&vyx djd vFk dk vkIkuh l tkuk tk ldrk gA

?kVd&I : fgrkisns'k (pk\$kEck lalÑr lkfgR; vkfÌ] okjk.klh)%

fe=kykHk (fe=kykHk&çLrko%lsydj dFkk 3 vFkkZr~ x`/zekt kjZdFkk

ds 114 os'ykd ^^mÙkeL;kçfi ———— lo`Ùloe;kçfrfFk%** rd)A 24 vÄï

(d) nksikBÔkakdh O;k[;kA (2×8=16 vÄï)

([k) lkjA (8 vÄï)

?kVd&II : uhfr'krd %'ykd&la[;k 1 ls 50 rdA 24 vÄï

(d) nks'ykdkadk ljykFkZA (2×8 =16 vÄï)

([k) ,d lwfDr dh O;k[;kA (8 vÄï)

?kVd&III : LkalÑrμO;kdj.k %24 vÄï

(d) 'kCnμ:i %jke] dfo] Hkkuq] fir] yrk] vLen~] fo}l~] jktu~

rn~ (rhuksafyÄkaesa)] ,d (rhuksafyÄkaesa)A (12 vÄï)

([k) /krqμ:i %Hkw] gl~] ue~] xe~] vl~] gu~] Ñ] uh] ;kp~] n'k~ op~

(dsoy yV~] yksV~] yÄ~] fof/fyÄ~] yV~ ydkjksaes) (12 vÄï)

?kVd&IV: (d) lfU/ %vp~ lfU/] gy~ lfU/ ,oafolxZ lfU/A 12vÄï

([k) d.BLFk nks'ykdkadk 'kq¼ ys[kuA

(ç'ui=k esa iwNs x, 'ykdksa lsfHkUu) 12vÄï

fo'ks"k funsZ'ku

1. ç'u&i=k vf/dre **120** vÄkadk gksxkA **30** vÄï vkUrfjd ewY;kadu dsfy;sfu/kZfjr gSA

2. ç'u&i=k esadqy ikp ç'u fn;stk,xsA çR;sd ç'u **24** vÄkadk gksxkA çFke ç'u ikBÔØe esafu/kZfjr pkjksa?kVdka ij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZ y?kqmÙkjh; okysfodYi jfgr vkB (8) ç'u iwNstk,xsA çR;sd y?kqÙkjkRed ç'u rhu (3) vÄkadk gksxkA 'ks"k pkj ç'ukaesaikBÔØe dsçR;sd ?kVd lsnksoSdfYid ç'u fn;stk,xsA ijh{kkFkhZdksbuesa lsçR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'u&i=kgy djusdk le; rhu (3) ?k.Vsgksxk A

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ç'ui=k&fuekZk dsfy;sfunsZ'k%&

1. ç'ui=k esadqy ikp (5) ç'u fn;stk,A ç'ui=k dsfy;sdqy 120 vÄï fu/kZfjr gSA lHkh ç'u lekukÄï gksasvFkkZr~ çR;sd ç'u pkSchl (24) vÄkadk gksxkA i'u&i=kgy djusdk le; rhu (3) ?k.Vsgksxk A

2. çFke ç'u ikBÔØe dspkjksa?kVdkaesafu/kZfjr fo"k;kadsvk/kj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZ y?kqmÙkjh; okysfodYi jfgr vkB (8) ç'u iwNstk,A çR;sd y?kqÙkjkRed ç'u rhu (3) vÄkadk gksxkA

3. f}rh;] rr̀h;] prqFkZ rFkk i×pe ç'u dk fuekZ.k iB~ÔØe ds Øe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ ?kVd esa fu/kZfjr fo"k; dsv/;k; ij fd;k tk,A iB~ÔØe ds çR;sd ?kVd l s nks o.kZukRed ç'u nsdj ijh{kkFkhZ l s çR;sd ?kVd l s ,d ,d ç'u dk mÙkj fy[kus dks dgk tk,A

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B.A. Part-I
Second Semester

w.e.f. Session : 2020-2021

SANSKRIT (ELECTIVE)

B-SKT-201 , Paper – II : JhenHkxonxhrk, LoLFkoÙk ,o 0;kdj.k

Credits = 6 iw.kkZad%120

vkUrfjd ewY;kadu%30

le; %3 ?k.Vs

CO-201-1 xhrk Hkkjrh; lLÑfr rFkk Kku dk mRd"k g A xhrk dk de rFkk Kku d lE;d ck/k d :i e tkuk tkrk g A xhrk d f}rh; v/;k; dk ^lk[;&;kx* d uke l tkuk tkrk gA bl v/;k; e thou d ee dk tkudj de dju dh ij.kk nh xb gA ;g lHkh eu";k dk tkuuk pkfg, A

CO-201-2 f}rh; ?kVd e uhfr'krd d 51&100 'ykdk dk 'kkfey fd;k x;k g A U;k; ,o uhfr ck/k thou dk ljy cuk nrk gA Hkrgfj u eu";k dk f'k{kk nu dk i;kl fd;k g fd gekjk lkekftd 0;ogkj dl gk A ;g lHkh Nk=k dk tkuuk pkfg, A

CO-201-3 lLÑr /kkr :ik d Kku d vHkko e Hkk"kk dk ugh le>k tk ldrk A /kkr iR;;k dk ck/k bl ?kVd e fn;k x;k gA lLÑr e /kkrvk dh l[;k nk gtkj d vklikl gA vr% budk ck/k Hkk"kk dk ljy :i e le>u e lgk;d gA

CO-201-4 lLÑr Hkk"kk e lkfgR; dk fy[ku dh rhu fof/k;k g] i|] x| rFkk nkuk dk feyk gvk Lo:i A i|k e jpuk d fy, NUnk dk Kku vko';d g A dfork Nn d fcuk ugh gk ldrhA vr% Nk=k dk vkjfEHk Nnk dk Kku bl ?kVd e fn;k tkrk g A Nk=k dh #fp dfork e gk ,lk Nnk d Kku l lHko g A

?kVd&I : JhenHkxonxhrk] f}rh; vè;k; µ 24vÄï

(d) nks'yksdksadk lIjykFkZ (2×8=16vÄï)

([k) ,d vkykspukRed ç'uA (8 vÄï)

?kVd-II : pjdlfgRkk LoLFkoÙke 24vÄï

(d) nk ifDr;k dh 0;k[;k-(2X8-16vÄï)

([k) ,d fucU/kkRed i'u (8vÄï)

?kVd&III : LkaÑrµO;kdj.k % 24vÄï

(d) 'kCnµ:i %efr] unh] /susq ekr] ÝQ] ;q'en~ lo] ,rn~ f}] f=kA (^lo* lsysdj ^f=k* rd rhuksafyÄksaes)A (12vÄï)

([k) /krqµ:i %iB~ u'k~ uì~ çPN~ #p~ g] Hkt~ ip~ yHk~ lsoA (dsoy yV~ ykV~ yÄ~ fof/fyÄ~ yV~ ydkjksaes) (12vÄï)

?kVd&IV : (d) NUn% &vuq"Vqi~ vk;kZ bUnzotz mi sUnzotzk oa'kLFk] f'k[kfj.kh] eUnkØkUrk] olUrfrydk] 'kknZwyfoØhfMrA 12vÄï

([k) fgUnh lsl aÑr esavuqoknA 12vÄï

—

fo'ks"k funZs'kµ

1. ç'u&i=kvf/dre 120 vÄïksadk gksxkA 30vÄïvkUrfjd eWY;kadu dsfy;sfu/kZfjr gSA

2. ç'u&i=k esadqy ikp ç'u fn;stk;xsA çR;sd ç'u 16 vÄïksadk gksxkA çFke ç'u ikB~Øe esafu/kZfjr pkjksa?kVdksa ij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh okys fodYi jfgr vkB (8) ç'u iwNstk,xsA çR;sd y?kqÙkjkRed ç'u rhu (3) vÄïksadk gksxkA 'ks"k pkj ç'uksaesaikB~Øe dsçR;sd ?kVd lsnksoSdfYid ç'u fn;stk,xsA ijh{kkFkhZdksbueals çR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'u&i=k gy djusdk le; rhu (3) ?k.Vsgksxk

—

ç'ui=k&fuekZk dsfy;sfunZs'k%&

1. ç'ui=k esadqy ikp (5) ç'u fn;stk,A ç'ui=k dsfy;sdqy 120 vÄïfu/kZfjr gSA lHkh ç'u lekuÄï gksusvFkkZ~ çR;sd ç'u pkSchl (24) vÄïksadk gksxkA i'u&i=k gy djusdk le; rhu (3) ?k.Vsgksxk

2. çFke ç'u ikBÔØe dspkjksa?kVdksaesafu/kZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bl dsvUrxZr y?kqmÙkj okysfodYi jfgr vkB (8) ç'u iwNstk,¡AçR;sd y?kqÙkjh; ç'u rhu (3) vÄ~dk gksxkA

3. f}rh;] rr̀h;] prqFkZrFkk i×pe ç'u dk fuekZk ikBÔØe dsØe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ?kVd esafu/kZfjr fo"k; dsvk/kkj ij fd;k tk,A ikBÔØe dsçR;sd ?kVd lsnksoSdfYid ç'u nsdj ijh{kkFkhZlsçR;sd ?kVd ls,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

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KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Examination for B.A. Part-II in the Subject of Sanskrit (Elective) (Semester System)

B.A. Part-II

Third Semester

w.e.f. Session : 2021-2022

SANSKRIT (ELECTIVE)

B-SKT-301, Paper – III : ,frgkfld egkdkO; ,o O;kdj.k

Credits = 6 iw.kkZad% **120**

vkUrfjd ewY;kadukad% **30**

le;% **3** ?k.Vs

?kVd&**I** : egkHkkjr: ;{k;f/kf"Bj lokn -(;Fkkor) 24vad

(d) lilx O;k[;k -(12 vad)

([k) ,d vkykspukRed i'u- (12 vad)

?kVd&**II** : jkek;.k: v;ks/;k dk.M, 'krre: lx: (dfPpn lx:) 24vad

(d) nk 'yksdk dk ljykFk - (12vad)

([k) fo"k;oLrq lEcfU/kr i'u- (12vad)

?kVd&**III** : Lkak.Ñr µO;kdj.k %24vad

(d) lekl & vO;;hHkko] rRiq#"k] }U}] rFkk cgqozhfgA (12vad)

([k) Ñr~i.R;; & DRok] rqequ~] .;r~] ;r~] Dr] Drorq] 'kr] 'kkup~] rO;] vuh;jA (12vad)

?kVd&**IV** : (d) ojnjkt]y?kq fl¼kUrdkSeqnh µ 24vad

i.R;kgkj lw= (ekgs'oj lw=) 12vad

([k) Lkak.Ñr&i=&ys[kueA 12vad

—

fo'ks"k funsZ'kµ

1. ç'u&i=k vf/kdre **120** vadksa dk gksxkA **30** vad vkUrfjd ewY;kadu ds fy; sfu/kkZfjr gSaA

2. ç'u&i=k esa dqy ikp ç'u fn;s tk,xsA çR;sd ç'u **16** vadksa dk gksxkA çFke ç'u ikBØe esa fu/kkZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okys fodYi jfgr vkB (8) ç'u iwNs tk,xsA çR;sd y?kwÙkjkRed ç'u rhu (3) vadksa dk gksxkA 'ks"k pkj ç'u ikBØe ds çR;sd ?kVd lsnks&nksfodYi d ç'u fn;s tk,xsA ijh{kkFkhZ dks bu esa ls çR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. iz'u&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

—

ç'ui=k&fuekZk dsfy;sfunZs'k&

1. ç'ui=k esadqy ikp (5) ç'u fn;stk,¡A ç'ui=k dsfy;sdqy 120 vÄïfu/kZfjr gSa I Hkh ç'u I ekukÄïgksa vFkkZ~ çR;sd ç'u pkSchl (24) vÄïksadk gksxkA i'zu&i=k gy djusdk I e; rhu (3) ?k.Vsgksxk A
2. çFke ç'u ikBÔØe dspkjksa?kVdksaesafu/kZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bl dsvUrxZr y?kqmÙkj okysfodYi jfgr vkB (8) ç'u iwNstk,¡A çR;sd y?kqÙkjkRed ç'u rhu (3) vÄïksadk gksxkA
3. f}rh;] rr̀h;] prqFkZ rFkk i×pe ç'u dk fuekZk ikBÔØe dsØe'k%çFke] f}rh;] rr̀h; rFkk prqFkZ ?kVd esafu/kZfjr fo"k; dsvk/kkj ij fd;k tk,A ikBÔØe dsçR;sd ?kVd I snksoSdfYid ç'u nsdj ijh{kkFkhZ I sçR;sd ?kVd I s,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

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B.A Sanskrit (Elective)

III Semester
w.e.f. Session : 2021-2022

SEC-1

i;kxkRed lL—r

Credits - 2 **dy vd & 40**
vkUrfjd eY;kdu &10
le; & 3?k.V

?kVd &1 lL—r lEHkk"k.k &8 vd

?kVd&2 vuokn ¼ fgUnh l lL—r½ &8 vd

?kVd&3 ¼d½"kCn : i jke, yrk, Qy efu, lk/k

rn vLen ;'en 4 vd

¼[k½ i= y[kue 4 vd

&8 vd

?kVd 4& dkjdfoHkfDr &8 vd

fo'kk funZkµ

1. ç'u&i=k vf/dre 40 vÄkadk gksxkA 10 vÄï vkUrfjd eWY;kadu dsfy; sfu/kZfjr gSA

2. ç'u&i=k esadqy ikp ç'u fn;s tk,xsA çR;sd ç'u 8 vÄkadk gksxkA çFke ç'u ikBÔØe esafu/kZfjr pkjksa?kVdksaij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okysfodYi jfgr pkj (4) ç'u iNstk,xsA çR;sd y?kqÙkjkRed ç'u nks(2) vÄkadk gksxkA 'ksk pkj ç'uksaesa ikBÔØe dsçR;sd ?kVd lsnksoSdfYid ç'u fn;s tk,xsA ijh{kkFkhZ dks buesals çR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'zu&i=k gy djusdk le; rhu (3) ?k.Vsgksxk A

iBuh; iLrd %&

1 lLÑr&O;ogkj&lkgl zh lLÑr Hkkjrh idk'ku A
2 ikjfEHkd jpukuokndkenh& MkW ñdfiyno f}osnh
Kku Hkkjrh idk'ku A

B.A. Part-II

Fourth Semester

w.e.f. Session : 2021-2022

SANSKRIT (ELECTIVE)

B-SKT-401, Paper – IV : egkdkO;, miU;kl ,oa O;kdj.k

Credits = 6

iw.kkZad % 120

vkUrfjd ewY;kadu % 30

le; % 3 ?k.Vs

?kVd&I : dkfynkl] j?kqoa'ke~ f}rh; lxZ 24 vad

(d) nks 'yksdksa dh O;k[;k (2×8=16 vad)

([k) ,d vkykspukRed iz'u vFkok ikBÔka'k dk lkj (8 vad)

?kVd&II : vfHkKkuÙkdqUry pkSFkk vad] f'k"; Hkkjr fot; ukVd iz'u fuf"kn 24 vad

(d) O;k[;k (16 vad)

([k) ,d vkykspukRed iz'u vFkok ikBÔka'k dk lkj (8 vad)

?kVd&III : Lka"Ñr O;kdj.k % 24 vad

(d) okP; & drZ̀okP;] deZokP; rFkk HkkookP; (8 vad)

([k) rf)r iz R;; & erq i~ bfu] Bu~ f.o] ry~ rFkk Nk (8 vad)

(x) [f.kt Ur rFkk lUur](#) /kkrq dsfl ¼:i (dsoy yV~ ydkj eas) & Hkw] vi~] xe~] ik] fy[k~ Jq] Ñ] nk] LFkk] gu (8 vad)

?kVd&IV : (d) ojnjkt] y?kqfl¼kUrdkSeqnh

lafkçdj.k (laKkgj.k lfgr O;k[;k) 12 vad

([k) vuqokn µ ljy fgUnh lsl a"Ñr esa vuqokn 12 vad

—

fo'ks"k funZs'k

1. ç'u&i= vf/kdre 120 vad dk gksxkA 30 vad vkUrfjd ewY;kadu ds fy; s fu/kkZfjr gSaA
2. ç'u&i= esa dqy ikap ç'u fn; s tk,axsA çR;sd ç'u 24 vad dk gksxkA çFke ç'u ikB~Øe ds fu/kkZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okys fodYi jfgr vkB (8) ç'u iwNs tk,axsA çR;sd y?kwÙkjkRed ç'u rhu (3) vad dk gksxkA 'ks"k pkj ç'u ikB~Øe ds çR;sd ?kVd ls nks&nks fodYi ds ç'u fn; s tk,axsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'zu&i=kgy djusdk le; rhu (3) ?kaVsgksxkA

—

ç'ui=k&fuekZ.k dsfy; sfunZs'k%&

1. ç'ui=k esadqy ikap (5) ç'u fn;stk,¡A ç'ui=k dsfy; sdqy 120 vÄ ïfu/kZfjr gSaA lHkh ç'u lekuvÄ ïgksaxsvFkkZr~ çR;sd ç'u pkSchl (24) vÄ ïkadk gksxkA i'zu&i=kgy djusdk le; rhu (3) ?kaVsgksxkA
2. çFke ç'u ikB~Øe dspkjksa?kVdksaesafu/kZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bldsvUrxZr y?kqmÙkj okysfodYi jfgr vkB (8) ç'u iwNstk,¡A çR;sd y?kqÙkjkRed ç'u rhu (3) vÄ ïkadk gksxkA
3. f}rh;] rr̀h;] prqFkZrFkk i×pe ç'u dk fuekZ.k ikB~Øe dsØe'k%çFke] f}rh;] rr̀h; rFkk prqFkZ?kVd esafu/kZfjr fo"k; dsvk/kkj ij fd;k tk,A ikB~Øe dsçR;sd ?kVd lsnksoSfYid ç'u nsdj ijh{kkFkhZ lsçR;sd ?kVd ls,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

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KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme of Examination for <u>B.A. Part-III</u> in the Subject of <u>Sanskrit (Elective)</u> (Semester System)

B.A. Part-III

Fifth Semester

w.e.f. Session : 2022-2023

SANSKRIT (ELECTIVE)

DSE-Sanskrit-I

B-SKT-501, Paper – V : ofnd lkfgR;, ukVd ,o O;kdj.k

Credits = 6 iw.kkZad % **120**
vkUrfjd ewY;kaadu % **30**
le; % **3** ?kaVs

?kVd&I : dkfynkl] vfHkKku'kkdqUrye~ iFke lsprqFkZ vad rdA 24 vad

(d) nks ikBÔkakksadh lçlax O;k[;kA (2×8=16 vad)

([k) ,d lwfDr dh O;k[;k vFkok fu/kkZfjr vadksa esa ls fdlh vad dk lkj vFkok ,d vkykspukRed ç'uA (8 vad)

?kVd&II : dkfynkl % thou&ifjp;] dky&foospu] dkO;&'kSyh] ukVÔ&'kSyhA 24 vad

?kVd&III : laLÑr lkfgR; dk bfrgkl % 24 vad

oSfnd lkfgR;&lafgrk] czkã.k] vkj.;d] mifu"kn~ osnkaxlkfgR;A

?kVd&IV: (d) ojn jkt] y?kqfl¼kUrdkSeqnh 12 vad

foHkfDr;FkZç dj.k % lw=kO;k[;k@iz;ksx&jpuk@'kCn&lq ¼&lk/kuA

([k) vyadkj % vuqizkl] 'ys"k] ;ed] miek] mRizs{kk] :id] vfr'k;ksfDr fo'ks"kksfDr] foHkkouk] vFkkZUrjU;kl A

(HkkeglHkke dks NksM+dj dsoy y{k.k] mnkgj.k ,oal axfr) 12 vad

—

fo'ks"k funsZ'k

1. ç'u&i= dk vf/kdre 120 vadksa dk gksxkA 30 vad vkUrfjd ewY;kadu ds fy;s fu/kkZfjr gSaA
2. ç'u&i= esa dqy ikap ç'u fn;s tk,¡xsA çR;sd ç'u 24 vadksa dk gksxkA çFke ç'u ikBÔØe esa fu/kkZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okys fodYi jfgr vkB (8) ç'u iwNs tk,¡xsA çR;sd y?kqÙkjkRed ç'u rhu (3) vadksa dk gksxkA 'ks"k pkj ç'ukas esa ikBÔØe ds çR;sd ?kVd ls nks&nks fodYi ç'u fn;s tk,¡xsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'zu&i=k gy djusdk le; rhu (3) ?k.Vs gksxkA

—

ç'ui=k&fuekZ.k dsfy; sfunZs'k&

1. ç'ui=k esadqy ikp (5) ç'u fn;s tk,¡A ç'ui=k dsfy; sdqy 120 vÄïfu/kZfjr gSaA lHkh ç'u lekuÄïgksa vFkkZr~ çR;sd ç'u pkSchl (24) vÄïksadk gksxkA i'zu&i=k gy djusdk le; rhu (3) ?k.Vs gksxkA
2. çFke ç'u ikB~;Øe dspkjksa?kVdksaesafu/kkZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bldsvUrxZr y?kqmÙkj okysfodYi jfgr vkB (8) ç'u iwNstk,¡A çR;sd y?kqmÙkjh; ç'u rhu (3) vÄïksadk gksxkA
3. f}rh;] rr̀h;] prqFkZrFkk i×pe ç'u dk fuekZ.k ikB~;Øe dsØe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ?kVd esafu/kkZfjr fo"k; dsvk/kkj ij fd;k tk,A ikB~;Øe dsçR;sd ?kVd lsnksoSdfYid ç'u nsdj ijh{kkFkhZ lsçR;sd ?kVd ls,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

DSE-1 **B.A Elective in Sanskrit (Third Year)**

Fifth Semester

w.e.f. Session : 2022-2023

B-SKT-502 /ke IL—fr ,o n'ku

Credits = 6 iw.kkZad% **120**

vkUrfjd ew;kadu% **30**

le; % **3** ?kaVs

?kVd&1%	JhenHkxonxhrk & }kn'k v/;k; ¼lEi.kZ½	&24 vad
?kVd&2%	ikr×ty ;kxlw=] lk/kuikn& lw= 29&55	&24 vad
?kVd&3%	"kkM'k lLdkjk dk egÙo	&24 vad
?kVd&4%	euLefr] v"Ve v/;k;	&24 vad

fo'ks"k funZs'k

1. ç'u&i= dk vf/dre **120** vadksa dk gksxkA **30** vad vkUrfjd ew;kadu ds fy;s fu/kZfjr gSaA
2. ç'u&i= esa dqy ikap ç'u fn;s tk;saxsA çR;sd ç'u **24** vadksa dk gksxkA çFke ç'u ikBîØe esa fu/kZfjr pkjksa ?kVdksa ij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okys fodYi jfgr vkB (8) ç'u iwNs tk;saxsA çR;sd y?kqmÙkjh; ç'u rhu (3) vadksa dk gksxkA 'ks"k pkj ç'uksa esa ikBîØe ds çR;sd ?kVd ls nks&nks fodYi ç'u fn;s tk;saxsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA
3. ç'u&i= gy djus dk le; rhu (3) ?kaVs gksxkA

ç'u i=&fuekZ.k ds fy;s funZs'k%&

1. ç'u i= esa dqy ikap (5) ç'u fn;s tk,¡A ç'u i= ds fy;s dqy 120 vad fu/kZfjr gSaA lHkh ç'u leku vad gksus ds vFkkZr~ çR;sd ç'u pkSchl (24) vadksa dk gksxkA ç'u&i= gy djus dk le; rhu (3) ?kaVs gksxkA
2. çFke ç'u ikBîØe ds pkjksa ?kVdksa esa fu/kZfjr fo"k;ksa ds vk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okys fodYi jfgr vkB (8) ç'u iwNs tk,¡A çR;sd y?kqmÙkjh; ç'u rhu (3) vadksa dk gksxkA
3. f}rh;] r`rh;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikBîØe ds Øe'k% çFke] f}rh;] r`rh; rFkk prqFkZ ?kVd esa fu/kZfjr fo"k; ds vk/kkj ij fd;k tk,A ikBîØe ds çR;sd ?kVd ls nks&nks fodYi ç'u nsdj ijh{kkFkhZ ls çR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kus dks dgk tk,A

iBuh; iLrd %&

1- JhenHkxonxhrk] rÙofoopuh Vhdk] xhrk iz sl] xksj[kiqj
2- ikrty;kxinhi] ekrhyky cukjlhnkl] ubZ fnYyh
3- fgUnw lLdkj] jktcyh ik.M;
4- euLefr

OR

DSE-1 **B.A Elective in Sanskrit (Third Year)**

Fifth Semester

w.e.f. Session : 2022-2023

B-SKT-503 Indian Perspectives in Personality Development

Hkkjrh; ifjizs{; eas O;fDrRo fodkl

Credits = 6 iw.kkZad%**120**

vkUrfjd ewY;kadu vad%**30**

le; %**3** ?k.Vs%

?kVd&1%	,frgkfld ifjizs{;	&24 vad
	_Xon&1-244-37	
	NkUnksX;ksifu'kn 6-2-3] 6-8-6] 8-1-4	
	cgnkj.;dksifuk'kn 2-5] 18&19	
?kVd&2%	ekuo dh vo/kkj.kk	&24 vad
	Xkhrk] iFke v/;k;] 1&30	
	{k=&{k=K fopkj] xhrk] v/;k; 13]1&2] 5&6]19&23	
	{kj&v{kj fopkj] xhrk] v/;k;&15 ¼lEiw.k½	
?kVd&3%	deZ;ksx] xhrk&v/;k;&2	&24 vad
?kVd&4%	ekuo&O;ogkj&ifj"dkj/ku	&24 vad
	Xkhrk] v/;k;&18] 41&62	

fo'ks"k funsZ'k%

1. ç'u&i= dh vf/kdre **120** vad dk gksxkA **30** vad vkUrfjd ewY;kadu ds fy;s fu/kkZfjr gSaA
2. ç'u&i= esa dqy ikap ç'u fn;s tk,xsaA çR;sd ç'u **24** vadksa dk gksxkA çFke ç'u ikBîØe esa fu/kkZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okys fodYi jfgr vkB (8) ç'u iwNs tk,xsaA çR;sd

y?kÙkjkRed ç'u rhu (3) vÄkadk gksaxsA 'ks"k pkj ç'uksa esa ikBÔØe dsçR;sd ?kVd lsnksoSfYid ç'u fn;s tk,xsA ijh{kkFkhZ dksbuesa lsçR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'zu&i=k gy djusdk le; rhu (3) ?k.Vsgksxk

ç'ui=k&fuekZ.k dsfy;sfunZs'k&

1. ç'ui=k esadqy ikp (5) ç'u fn;stk,A ç'ui=k dsfy;sdqy 120 vÄ fu/kZfjr gSaA lHkh ç'u lekukÄ gksadsvFkkZr~ çR;sd ç'u pkSchl (24) vÄksadk gksxkA i'zu&i=k gy djusdk le; rhu (3) ?k.Vsgksxk

2. çFke ç'u ikBÔØe dspkjksa?kVdksa esafu/kZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bl dsvUrxZr y?kqmÙkj okysfodYi jfgr vkB (8) ç'u iwNstk,A çR;sd y?kÙkjkRed ç'u rhu (3) vÄksadk gksxkA

3. f}rh;] rr̀h;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikBÔØe dsØe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ?kVd esafu/kZfjr fo"k; dsvk/kkj ij fd;k tk,A ikBÔØe dsçR;sd ?kVd lsnksoSfYid ç'u nsdj ijh{kkFkhZ lsçR;sd ?kVd ls,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

iBuh; iLrd %&

1 _Xon

2 NkUnkX;ksifu"kn~

3 Oksgnkj.;dksifu'kn~

4 JhenHkkxonxhrk rÙo foopuh Vhdk] xhrk il xkj[kij

OR

DSE-Sanskrit-I

<u>B-SKT-504-MOOC from SWAYAM PORTAL</u>

SEC-3

B.A. Sanskrit Elective Fifth Semester Part-III (Third Year)

(w.e.f. Session : 2022-2023)

B-SKT-505 Hkk"kk foKku d ey fl)kUr

Credits- 2 **dy vd & 40**

vkUrfjd eY;kdu & 10

le; & 3 ?k.V

?kVd e&I% Hkk"kk foKku ifjHkk"kk] {ks=] Ok"S kf"V;] Hkk"kkxr ifjorZu ,oa Hksn] Hkk"kk ifjorZu dsdkj.kA 8 vÄd%

?kVd e&II% Hkk"kkvksadk oxhZdj.k] ifjokjksadk ifjp;A 8 vÄd%

?kVd e&III% oSfnd ,oa ykSfdd laLÑr] vFkZ ifjorZu dsdkj.k A 8 vÄd%

?kVd e&IV% èofu foKku] èofu;ksadk oxhZdj.k 8 vÄd%

#i foKku ,oa okD; foKku] 'kCn fuekZ.k] /kkrq] izR;; A

fo'ksk funZsk

1. ç'u&i=k vf/dre 40 vÄksadk gksxkA 10 vÄ vkUrfjd eWY;kdu dsfy; sfu/kZfjr gSaA

2. ç'u&i=k esadqy ikp ç'u fn;stk,xsA çR;sd ç'u 8 vÄksadk gksxkA çFke ç'u ikBÔØe esafu/kZfjr pkjksa ?kVdksaij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh okysfodYi jfgr pkj (4) ç'u iNsstk,xsA çR;sd y?kqÙkjh; ç'u nks (2) vÄksadk gksxkA 'ksk pkj ç'u ukeesa ikBÔØe dsçR;sd ?kVd lsnksoSdfYid ç'u fn;stk,xsA ijh{kkFkhZ dksbuesalsçR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. ç'u&i=k gy djusdk le; rhu (3) ?k.Vs gksxkA

ç'ui=k&fuekZ.k dsfy; sfunZs'k&

1. ç'ui=k esadqy ikp (5) ç'u fn;stk,A ç'ui=k dsfy;sdqy 40 vÄ fu/kZfjr gSaA lHkh ç'u lekukÄ gksxsa vFkZr~ çR;sd ç'u vkB (8) vÄksadk gksxkA iz'u&i=k gy djusdk le; rhu (3) ?k.Vs gksxkA

2. çFke ç'u ikBÔØe dspkjksa ?kVdksaesafu/kZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh okysfodYi jfgr pkj (4) ç'u iNsstk,A çR;sd y?kqÙkjh; ç'u nks (2) vÄksadk gksxkA

3. f}rh;] rr̀h;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikBÔØe dsØe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ ?kVd esa fu/kkZfjr fo"k; dsvk/kkj ij fd;k tk,A ikBÔØe dsçR;sd ?kVd lsnksoSdfYid ç'u ndj ijh{kkFkhZ lsçR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

iBuh; iLrd %&

1- Hkkjrh; ukV~; fl)kUr
2- ckc jke lDlsuk] lkekftd Hkk"kk foKku
3- mes'k pUnz f}osnh] Hkk"kk vkSj Hkk"kdh

B.A. Part-III

Sixth Semester

w.e.f. Session : 2022-2023

SANSKRIT (ELECTIVE)

DSE-Sanskrit-2

B-SKT-601, Paper – VI : ukVd, ykfdd lkfgR; ,o O;kdj.k

Credits = 6 iw.kkZad%120

vkUrfjd ewY;kadu%30

le;%3 ?k.Vs

?kVd&I : dkfynkl] vfHkKku'kkdqUrye~ i×pe lsl Rre vad 24vad

(d) nks ik|ka'kksa dh lçlax O;k[;kA (2×8=16vad)

([k) ,d lwfDr dh O;k[;k vFkok fu/kkZfjr vadksa esa lsfdlh vadds lkj vFkok ,d vkykspukRed ç'uA (8vad)

?kVd&II : dkfynkl dh Ñfr;ksa esa tho u&nf"V] jk"Vªh; Hkkouk] çÑfr&fp=.k] vyadkj&ç;ksxA 24vad

?kVd&III : laLÑr lkfgR; dk bfrgkl % 24vad

okYehfd] O;kl] HkklHkfr] vfEcdknÙk O;kl] Hkkjfo] fo".kq'kekZ] Hkr`gfj] ck.kHkê] n.Mh (ys[kdksa vkSj mudh Ñfr;ksa dk laf{kIr ifjp;)A

?kVd&IV: (d) ojnjkt] y?kqfl¼kUrdkSeqnh 12vad

L=hçR;; izdj.k %mnkgj.k lfgr lw=ksa dh O;k[;kA

([k) laLÑr&fucU/k (ljy fo"k; ij laLÑr esa ,d fucU/k) 12vad

—

fo'ks"k funsZ'k

1. ç'u&i= dk vf/kdre 120vadksa dk gksxkA 30vad vkUrfjd ewY;kadu ds fy;s fu/kkZfjr gSaA
2. ç'u&i= esa dqy ikap ç'u fn;s tk;saxsA çR;sd ç'u 24 vadksa dk gksxkA çFke ç'u ikB~;Øe esa fu/kkZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjkRed vkB (8) ç'u iwNs tk;saxsA çR;sd y?kqÙkjkRed ç'u rhu (3) vadksa dk gksxkA 'ks"k pkj ç'u ikB~;Øe ds çR;sd ?kVd ls nks&nks fodYi ds ç'u fn;s tk;saxsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA
3. iz'u&i= gy djus dk le; rhu (3) ?k.Vs gksxkA

—

ç'ui=k&fuekZ.k dsfy; sfunZs'k%&

1.ç'ui=k esa dqy ikap (5) ç'u fn;s tk,¡A ç'ui=k dsfy; s dqy 120 vÄ fu/kZfjr gSaA lHkh ç'u lekuk vÄ ds gksaxsA vFkZ~
ç'ud ç'u pkSchl (24) vÄ dk gksxkA iw.kZ ç'ui=k gy djus ds fy, le; rhu (3) ?kaVs gksxkA
2.çFke ç'u ikB~;Øe ds pkjksa ?kVdksa esa fu/kZfjr fo"k;ksa ds vk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bl ds vUrxZr
y?kqmÙkjh; vkys[kuh; iz'u iwNs tk,¡A ç'ud y?kqÙkjh; ç'u rhu (3) vÄ dk gksxkA
3.f}rh;] r`rh;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikB~;Øe ds Øe'k% çFke] f}rh;] r`rh; rFkk prqFkZ ?kVd esa fu/kZfjr
fo"k; ds vk/kkj ij fd;k tk,A ikB~;Øe ds ç'ud ?kVd ls nks&nks fodYi ds ç'u nsdj ijh{kkFkhZ ls ç'ud ?kVd ls ,d
,d ç'u dk mÙkj fy[kus dks dgk tk,A

DSE-2

B.A Elective in Sanskrit (Third Year)

Sixth Semester

w.e.f. Session : 2022-2023

B-SKT-602 lLdr lkfgR; e uhfr ,o vkpkj

Credits = 6 iw.kkZÄ%120

vkUrfjd ewY;kÄ ùkÄ%30

le; %3 gksjk%

?kVd&1%	jkek;.k] v;ks/;k dk.M] iFke lx ¼i.k½	&24 vÄ
?kVd&2%	egkHkkjr] "kkfUr io] v/;k;] 109 'yksd 1&13	&24 vÄ
?kVd&3%	egkHkkjr] vkj.;d io v/;k; &297 'yksd& 26&31] 34&47] 52&59	&24 vÄ
?kVd&4%	o½pk.kD; uhfr 'yksd& 1-24] 1-32] 2-8] 4-15] 5-2 7-2] 10-2] 10-3] 10-9] 12-12	&24 vÄ

fo'ks"k funZs'k%u

1. ç'u&i=k vf/kdre **120** vÄ dk gksxkA **30** vÄ vkUrfjd ewY;kadu ds fy; s fu/kZfjr gSA

2. ç'u&i=k esadqy ikp ç'u fn;s tk,¡xsA çR;sd ç'u 24 vÄkadk gksxkA çFke ç'u ikBîØe esafu/kZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okys fodYi jfgr vkB (8) ç'u iwNs tk,¡xsA çR;sd y?kqÙkjkRed ç'u rhu (3) vÄkadk gksxkA 'ks"k pkj ç'uksa esa ikBîØe ds çR;sd ?kVd ls nks&nks fodYi ds ç'u fn;s tk,¡xsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'zu&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

ç'ui=k&fuekZ.k ds fy; s funsZ'k&

1. ç'ui=k esa dqy ikp (5) ç'u fn;s tk,¡xsA ç'ui=k ds fy;s dqy 120 vÄï fu/kZfjr gSaA lHkh ç'u lekukÄï gksaxs vFkkZr~ çR;sd ç'u pkSchl (24) vÄkadk gksxkA i'zu&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

2. çFke ç'u ikBîØe ds pkjksa ?kVdksa esa fu/kZfjr fo"k;ksa ds vk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okys fodYi jfgr vkB (8) ç'u iwNs tk,¡A çR;sd y?kqÙkjkRed ç'u rhu (3) vÄkadk gksxkA

3. f}rh;] rr̀h;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikBîØe ds Øe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ ?kVd esa fu/kZfjr fo"k; ds vk/kkj ij fd;k tk,A ikBîØe ds çR;sd ?kVd ls nks fodYi ç'u nsdj ijh{kkFkhZ ls çR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kus dks dgk tk,A

OR

DSE-2

B.A Elective in Sanskrit (Third Year)

Sixth Semester

w.e.f. Session : 2022-2023

B-SKT-603 laL—r lkfgR; eaas jk"Vªokn

Credits = 6 iw.kkZÄ% **120**

vkUrfjd ewY;kÄu% **30**

le; % **3** ?k.Vs

?kVd& 1 Hkkjrh; jk"Vªokn vFkoZosn iFoh lDr ¼1&30 e=½ &24 vÄ

?kVd& 2 Hkkjro"k ukedj.k ¼ofnd vkj ikjkf.kd lUnHk½

jk"Vªh; xku, jk"Vªh; xhr, jk"Vªh; /ot, jk"Vªh; fpUgu, "kd lor,

fode lor &24 vÄï

?kVd& 3 HkxrQy flg pfjre (iFke v/;k;) &24 vÄï

?kVd& 4 Hkkfr e Hkkjre MkO jekdkUr "kDy ¼1&30 "kykd ½&24 vÄï

o'kSk funZkµ

1. ç'u&i=k vf/dre 120 vÄkadk gksxkA 30 vÄï vkUrfjd eY;kadu dsfy; sfu/kZfjr gSA

2. ç'u&i=k esadqy ikp ç'u fn;s tk;xsA çR;sd ç'u 24 vÄkadk gksxkA çFke ç'u ikBîØe esafu/kZfjr pkjkas?kVdkas ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okys fodYi jfgr vkB (8) ç'u iwNs tk;xsA çR;sd y?kqÙkjkRed ç'u rhu (3) vÄkadk gksxkA 'ks"k pkj ç'u ikBîØe dsçR;sd ?kVd lsnksoSdfYid ç'u fn;s tk;xsA ijh{kkFkhZdksbuesalsçR;sd ?kVd ds,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. i'zu&i=k gy djusdk le; rhu (3) ?k.Vsgksxk A

ç'ui=k&fuekZk dsfy; sfunZk%&

1. ç'ui=k esadqy ikp (5) ç'u fn;stk,A ç'ui=k dsfy;sdqy 120 vÄïfu/kZfjr gSA lHkh ç'u lekukÄïgksasvFkkZr~ çR;sd ç'u pkSchl (24) vÄkadk gksxkA i'zu&i=k gy djusdk le; rhu (3) ?k.Vsgksxk A

2. çFke ç'u ikBîØe dspkjkas?kVdkasesafu/kZfjr fo"k;kadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kqmÙkjh; okysfodYi jfgr vkB (8) ç'u iwNs tk,A çR;sd y?kqÙkjkRed ç'u rhu (3) vÄkadk gksxkA

3. f}rh;] r`rh;] prqFkZ rFkk i×pe ç'u dk fuekZk ikBîØe dsØe'k% çFke] f}rh;] r`rh; rFkk prqFkZ ?kVd esafu/kZfjr fo"k; dsvk/kkj ij fd;k tk,A ikBîØe dsçR;sd ?kVd lsnksoSdfYid ç'u nsdj ijh{kkFkhZ lsçR;sd ?kVd ls,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

iBuh; iLrd %&

1 vFkoon] 12-1-1&30 (Hkfe lDr)

2 HkxrQy pfjre~

3 Hkkfr esaHkkjre~ (MkÑjekdkUr 'kDy)

OR

DSE-Sanskrit-2

B-SKT-604-MOOC from SWAYAM PORTAL

SEC-4

B.A. Elective Part-III
Sixth Semester
w.e.f. Session : 2022-2023

B-SKT-605 l.LÑr p; fudk-I

Credits- 2

dqy vÄï %40
vkUrfjd eWY;kÄu %10
le; %3 ?k.Vs

?kVd&I : laLÑr–p; fudk (dqekjlEHko fo'ofo|ky; çdk'ku) %
i|Hkkx %1–6 ikB 8vÄï

?kVd&II : laLÑr–p; fudk %x|Hkkx %1–9 ikBA 8vÄï

?kVd&III : laLÑr–O;kdj.k % 8vÄï

(d) 'kCn–:i %ckyd] dfo] lk/kq] fir] ekr] ÝQy] fo}l~ 'kf'kuA (4vÄï)

([k) /kkrq:i %Hkw] von~] LFkk] yHk~] nk (;PN~)] çPNA (dsoy yV~] yksV~] yÄ~] fof/fyÄ~] yV~ ydkjksa esa) (4vÄï)

?kVd&IV : (d) Lojlfu/A 4vÄï

([k) JhenHkkxonxhrk ls d.BLFk pkj 'yksdksa dk 'kq¼ y§ku (ç'ui=k esa iwNs x, 'yksdksa ls fHkUu) A 4vÄï

—

fo'ks"k funsZ'ku

1. iz'u&i=k vf/dre 40vÄïksa dk gksxkA 10 vÄï vkUrfjd eWY;kadu ds fy; sfu/kZfjr gSaA

2. iz'u&i=k esa dqy ikp ç'u fn;s tk,xsA çR;sd ç'u 8 vÄïksa dk gksxkA çFke ç'u ikBîØe esa fu/kZfjr pkjksa ?kVdksa ij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okys fodYi jfgr pkj (4) ç'u iwNs tk,xsA çR;sd y?kqÙkjh; ç'u nks (2) vÄïksa dk gksxkA 'ks"k pkj ç'uksa esa ikBîØe ds çR;sd ?kVd ls nks&nks fodYi d ç'u fn;s tk,xsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. iz'u&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

—

ç'ui=k&fuekZ.k ds fy; sfunsZ'k&

1. ç'ui=k esa dqy ikp (5) ç'u fn;s tk,A ç'ui=k ds fy; s dqy 40 vÄï fu/kZfjr gSaA lHkh ç'u lekuÄï gksa vFkkZ~ çR;sd ç'u vkB (8) vÄïksa dk gksxkA iz'u&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

2. çFke ç'u ikBîØe ds pkjksa ?kVdksa esa fu/kZfjr fo"k;ksa ds vk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okys fodYi jfgr pkj (4) ç'u iwNs tk,A çR;sd y?kqÙkjh; ç'u nks (2) vÄïksa dk gksxkA

3. f}rh;] rr̀h;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikBÔØe ds Øe'k% çFke] f}rh;] rr̀h; rFkk prqFkZ ?kVd esa fu/kkZfjr fo"k; ds vk/kkj ij fd;k tk,A ikBÔØe ds çR;sd ?kVd ls nks oSdfYid ç'u nsdj ijh{kkFkhZ ls çR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kus dks dgk tk,A

OR

SEC-4

B.ASanskrit Elective (Third Year)

Sixth Semester

w.e.f. Session : 2022-2023

B-SKT-606 **lrfyr thou i)fr**

Credits- 2

dy vd & 40

vkUrfjd eY;kdu & 10

le; & 3 ?k.V

?kVd&1½ Jo.k] euu] fufn/;klu &8 vÄï

cgnkj.;d mifu'kn 2-4-5

?kVd&2½ fpÙkofÙkfujks/k ¼;kx lw= 1&11½ &8 vÄï

?kVd&3½ Kku;kx] de;kx ,o HkfDr;kx ¼xhrk 3-5&21½ &8 vÄï

?kVd&4½ /;ku ;kx ¼;kx lw= 1-12&24 2-29]30]32]46]49]50 3-1&4½ &8 vÄï

fo'ks"k funsZ'k

1. ç'u&i=k vf/kdre **40** vÄkas dk gksxkA **10** vÄï vkUrfjd eY;kadu ds fy;s fu/kkZfjr gSaA

2. ç'u&i=k esa dqy ikp ç'u fn;s tk,xsA çR;sd ç'u **8** vÄkas dk gksxkA çFke ç'u ikBÔØe esa fu/kkZfjr pkjksa ?kVdksa ij vk/kkfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kqmÙkj okys fodYi jfgr pkj (4) ç'u iwNs tk,xsA çR;sd y?kqÙkjh; ç'u nks (2) vÄkas dk gksxkA 'ks"k pkj ç'u ikBÔØe ds çR;sd ?kVd ls nks oSdfYid ç'u fn;s tk,xsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. iz'u&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

ç'ui =&fuekZ.k dsfy;sfunZs'k%&

1. ç'ui =k esadqy ikp (5) ç'u fn;s tk,¡A ç'ui =k dsfy;sdqy 40 vÄï fu/kZfjr gSaA lHkh ç'u lekukÄï gksasvFkkZr~ çR;sd ç'u vkB (8) vÄksadk gksxkA i'zu&i =k gy djusdk le; rhu (3) ?kVsgksxkA

2. çFke ç'u ikBÔØe dspkjksa?kVdksaesafu/kZfjr fo"k;ksadsvk/kkj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA bldsvUrxZr y?kqmÙkj okysfodYi jfgr pkj (4) ç'u iwNstk,¡A çR;sd y?kqmÙkjkRed ç'u nks (2) vÄksadk gksxkA

3. f}rh;] rrh;] prqFkZrFkk i×pe ç'u dk fuekZ.k ikBÔØe dsØe'k%çFke] f}rh;] rrh; rFkk prqFkZ ?kVd esafu/kZfjr fo"k; dsvk/kkj ij fd;k tk,A ikBÔØe dsçR;sd ?kVd lsnks oSdfYid ç'u nsdj ijh{kkFkhZ lsçR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kusdksdgk tk,A

iBuh; iLrd %&

1- cgnkj.;kifu"kn
2- ikrty;kxinhi, ekrhyky cukjlh nkl, ub fnYyh
3- JhenHkxon xhrk

CO, PO, PSO MATRIX (MAPPING) B.A SANSKRIT (ELECTIVE)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO2	PSO 3	PSO 4
B-SKT-101 CO	2.5	2.5	2.5	2	3	3	2.5	3	3	2.75	3	2.75
B-SKT-201 CO	2.75	3	2.5	2	3	2.75	2.75	3	2.75	3	2.75	3

COs, POs, MAPPING MATRIX B.A SEMESTER I

SANSKRIT ELECTIVE PAPER I

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
B-SKT-101 CO 101.1	3	2	3	2	3	3	3	3
B-SKT-101 CO 101.2	3	3	3	2	3	3	3	3
B-SKT-101 CO 101.3	2	3	2	2	3	3	2	3
B-SKT-101 CO 101.4	2	2	2	2	3	3	2	3
AVG	2.5	2.5	2.5	2	3	3	2.5	3

COs, POs, MAPPING MATRIX B.A SEMESTER II

SANSKRIT ELECTIVE PAPER II

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
B-SKT-201 CO 201.1	3	3	3	2	3	3	3	3
B-SKT-201 CO 201.2	3	3	3	2	3	3	3	3
B-SKT-201 CO 201.3	3	3	2	2	3	2	2	3
B-SKT-201 CO 201.4	2	3	2	2	3	3	2	3
AVG	2.75	3	2.5	2	3	2.75	2.75	3

COs, PSOs MAPPING MATRIX

B.A SEMESTER I SANSKRIT (ELECTIVE)

	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-101 CO-1	3	2	3	3
CO-2	3	3	3	3
CO-3	3	3	3	2
CO-4	3	3	3	3
AVG	3	2.75	3	2.75

COs, PSOs MAPPING MATRIX

B.A SEMESTER II SANSKRIT (ELECTIVE)

	PSO 1	PSO2	PSO 3	PSO 4
BH-SKT-201 CO-1	3	3	3	3
CO-2	2	3	2	3
CO-3	3	3	3	3
CO-4	3	3	3	3
AVG	2.75	3	2.75	3

Kurukshetra University, Kurukshetra

Department of Sanskrit, Pali & Prakrit

Subject-Sanskrit

Scheme of Examination and Syllabus

B.SC. Non-Medical Programme

Under CBCS W.E.F Academic Session 2021-2022

Distribution of Contact Hours Subject Wise and Credit Wise per week
Semester III

Semester	Course	Credits	Credits for Theory and Practical	Contact Hours
III Semester	CC-Maths-3	8	6+2	6+4
	CC-(Elective Discipline-1)-3	8	6+2	6+4
	CC-(Elective Discipline-2)-3	8	6+2	6+4
	AECC-3-Hindi/Sanskrit	2	2	2
	SEC-1	2	2	2
	TOTAL	28	28	34

Kurukshetra University, Kurukshetra

Department of Sanskrit, Pali & Prakrit

Subject-Sanskrit

Scheme of Examination and Syllabus

B.SC- Medical Programme

Under CBCS W.E.F Academic Session 2021-2022

Distribution of Contact Hours Subject Wise and Credit Wise per week
Semester III

Semester	Course	Credits	Credits for Theory and Practical	Contact Hours
III Semester	CC-Botany-3	8	6+2	6+4
	CC-Zoology-3	8	6+2	6+4
	CC-Chemistry/Biochemistry/Biotechnology-3	8	6+2	6+4
	AECC-3- Hindi/Sanskrit	2	2	2
	SEC-1	2	2	2
	TOTAL	28	28	34

KURUKSHETRA UNIVERSITY KURUKSHETRA

Syllabus & Scheme of Examination for B.Sc. Part-II (Second Year in Medical & Non Medical) in the Subject of B.Sc Sanskrit under Choice Based Credit System Structure of B.Sc Programme under CBCS

AECC-3 **B.Sc. Part-II (Second Year)**

Third Semester

w.e.f. 2021-2022

B-SKT-302

laLÑr p;fudk ,oa O;kdj.k

Credits-2

dqy vÄï % 40

vkUrfjd ewY;kÄïu % 10

le; % 3 ?k.Vs

?kVd&I :

laLÑr&p;fudk (dq#{ks=k fo'ofo|ky; çdk'ku)% 8vÄï

i|Hkkx % ikB 1 ls ikB 5 rdµ

(1) bZ'kLro%] (2) o;a Roka Hktke%] (3) /eZKks jke%]

(4) lk/qozra pj] (5) foHkh"k.kL; foyki%A

?kVd&II :

laLÑr&p;fudk % 8vÄï

x|Hkkx % ikB 1 ls ikB 5 rdµ

(1) vuq'kklue~] (2) ln~o`Ùke~] (3) cqf¼;ZL; cya rL;]

(4) uhyo.kZ% Ük`xky%] (5) 'k'kdL; pkrq;Ze~A

?kVd&III : laLÑr&O;kdj.k % 8vÄï

'kCn&:i % jke] nso] yrk] ÝQy] eqfu] lk/q] ekr`] rn~ (rhuksa

fyÄõksa esa)] vLen~] ;q"en~A

?kVd&IV : vp~lfU/ % xq.k] o`f¼] ;.k~] v;kfnA 8vÄï

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fo'ks"k funsZ'kµ

1. iz'u&i=k vf/dre **40** vÄïksaa dk gksxkA **10** vÄï vkUrfjd ewY;kadu ds fy;s fu/kZfjr gSaA

2. iz'u&i=k esa dqy **ik¡p** ç'u fn;s tk,¡xsA çR;sd ç'u **8** vÄïksaa dk gksxkA **çFke ç'u** ikBÔØe esa fu/kZfjr pkjksa ?kVdksa ij vk/kfjr rFkk vfuok;Z gksxkA blds vUrxZr y?kq mÙkj okys fodYijfgr pkj (4) ç'u iwNs tk,¡xsA çR;sd y?kwÙkjkRed ç'u nks (2) vÄïksa dk gksxkA 'ks"k pkj ç'uksa esa ikBÔØe ds çR;sd ?kVd ls nks oSdfYid ç'u fn;s tk,¡xsA ijh{kkFkhZ dks buesa ls çR;sd ?kVd ds ,d ,d ç'u dk mÙkj fy[kuk gksxkA

3. iz'u&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA

—

ç'ui=k&fuekZ.k ds fy;s funsZ'k%&

1.ç'ui=k esaa dqy ik¡p (5) ç'u fn;s tk,¡A ç'ui=k ds fy;s dqy 50 vÄï fu/kZfjr gSaA lHkh ç'u lekukÄï gksaxs vFkkZr~ çR;sd ç'u vkB (8) vÄïksa dk gksxkA iz'u&i=k gy djus dk le; rhu (3) ?k.Vs gksxkA
2. **çFke ç'u** ikBÔØe ds pkjksa ?kVdksa esa fu/kZfjr fo"k;ksa ds vk/kj ij cuk;k tk,A ;g ç'u vfuok;Z gksxkA blds vUrxZr y?kq mÙkj okys fodYijfgr pkj (4) ç'u iwNs tk,¡A çR;sd y?kwÙkjkRed ç'u nks (2) vÄïksa dk gksxkA
3. f}rh;] r`rh;] prqFkZ rFkk i×pe ç'u dk fuekZ.k ikBÔØe ds Øe'k% çFke] f}rh;] r`rh; rFkk prqFkZ ?kVd esa fu/kZfjr fo"k; ds vk/kj ij fd;k tk,A ikBÔØe ds çR;sd ?kVd ls nks oSdfYid ç'u nsdj ijh{kkFkhZ ls çR;sd ?kVd ls ,d ,d ç'u dk mÙkj fy[kus dks dgk tk,A

DEPARTMENT OF MUSIC AND DANCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme and Syllabus
For IIHS
B.A. Music Vocal
W.E.F Session 2020-21

According to CBCS & LOCF
(CHOICE BASED CREDIT SYSTEM & LEARNING OUTCOME BASED CURRICULUM FRAMEWORK)

KURUKSHETRA UNIVERSITY
KURUKSHETRA
2020-21

Programme Outcomes (PO) of Bachelor of Arts (General) CBCS Programmes/Courses in the Institute of Integrated and Honours Studies, Kurukshetra University, Kurukshetra

PO 1: Demonstrate a detailed knowledge and understanding of selected fields of study in core disciplines in the humanities, social sciences and languages;

PO 2: Apply critical and analytical skills and methods to the identification and resolution of problems within complex changing social contexts.

PO 3: Demonstrate a general understanding of the concepts and principles of selected areas of study outside core disciplines of the humanities, social sciences and languages;

PO 4: Apply an independent approach to knowledge that uses rigorous methods of inquiry and appropriate theories;

PO 5: Articulate the relationship between diverse forms of knowledge and the social, historical and cultural contexts that produced them;

PO 6: Communicate effectively and and show ability to read, write, listen to and speak in a chosen language/s with fluency;

PO 7: Act as informed and critically discerning participants within the community of scholars, as citizens and in the work force;

PO 8: Work with independence, self-reflection and creativity to meet goals and challenges in the workplace and personal life.

PSO' s of B.A. Music (General)

1. Imparts knowledge about the basic principles of music .

2. Imparts skill based education and grooming for Stage performance .

3. Ensures employability after graduation.

4. Encourages Team work spirit and Introduces social significance of the music .

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Music (Vocal) Ist Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMV 111A	Basic Principals of Indian Classical Music –I (Theory)	2+0+0	2	3 Hours	40		10	50
	BMV 111B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music (Vocal) IInd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMV 121A	Basic Principals of Indian Classical Music-II (Theory)	2+0+0	2	3 Hours	40		10	50
	BMV 121B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

SYLLABUS AND COURSES OF READING

B.A. Music (Vocal)
SEMESTER-Ist

Paper -1
BMV 111A : Basic Principals of Indian Classical Music-I (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1. The students will be able to describe the Ragas and Talas.
2. The students will be able to define the terminologies of Indian classical music.

3. The students will be able to explain the rich history of Indian music and the contribution of renowned musician.

NOTE: There shall be seven Questions in all. Question no 1 will be compulsory, objective type and covers whole syllabus. The candidate shall be required to attempt four questions, selecting one question from each section. All questions carry equal marks.

Syllabus and course of reading

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b)Ability to write the notation of Drut Khayal in the following Ragas:

(1) Yaman (2) Bhupali

(c) Ability to write Thekas with dugun in the following Talas:

(1) Kehrawa (2) Teentaal.

SECTION-B

(a) Short notes on the followings:

Sangeet,Swar,Alankaar,Saptak,Raag,Thaat,Jaati,Vaadi, Samvaadi, Vivadi ,Anuvadi VarjitSwar, Taal, Khayal, Taan, Sthai - Antra.

(b) Describe in detail about V.N Bhatkhande's Notation System.

(c) Relationship of Folk and Classical Music.

SECTION-C

(a) History of India Music from Vedic period to 12th Century.

(b) Contribution towards Music by the followings:

(1) V.N. Bhatkhande (2) V.D. Palustkar

(c) Detailed study of the following Instruments.

(1) Taanpura (2) Guitar

B.A. Music (Vocal)
SEMESTER 1st

Paper: 2
BMV 112B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of Singing.

2 The students will be able to demonstrate ragas and taalas.

3 The students will be able to tune their particular Instrument.

Syllabus and course of reading

(a) Two Drut Khayal's with Taan in each of the Ragas prescribed in the syllabus.

(b) Ability to sing any Five basic alankars in Shudh Swaras.

(c) Ability to demonstrate Teental and Kehrawa by hand in Thah and Dugun Layakaries with reciting bols.

(d) Ability to sing National Anthem on Harmonium .

(e) Tuning of Tanpura.

B.A. Music (Vocal)
SEMESTER-IInd

Paper -1
BMV 121A : Basic Principals of Indian Classical Music-II (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe Ragas and Talas in detail.
2 The students will be able to illustrate the historical trends of Indian classical music.

3 The students will be able to describe the various theoretical aspects of Indian classical music.

NOTE: There shall be seven Questions in all. Question no 1 will be compulsory, objective type and covers whole syllabus. The candidate shall be required to attempt four questions, selecting one question from each section. All questions carry equal marks.

Syllabus and course of reading

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to Write the notation of any one vilambit Khayal in any of the prescribed ragas.

(c) Ability to write the notation of all Drut Khayal in the following Ragas:

(1) Hameer (2) Vrindavani Sarang (3) Bhairav

(d) Ability to write the Thekas with dugun Layakaries in the following Talas:

(1) Ek Taal (2) Chautaal

SECTION-B

(a) Short notes on the following:

Naad,Shruti,Varan,Aavartan,Tarana, Kan,Khatka,Murki,Gamak,Aalap,Lakshan Geet,Laya.

(b) Classification of Indian Musical Instruments.

(c) Concept of Time Theory in Indian Classical Music.

SECTION-C

(a) Role of Media in the development of Indian Classical Music.

(b) Gayakon ke Gun-Dosh.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Omkarnath Thakur (2) Ustad Abdul Kareem Khan

B.A. Music (Vocal)
SEMESTER: IInd

Paper: 2
BMV 121B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome
1 The students will be able to demonstrate ragas.

2 The students will be able to play taalas on hand.

3 The Students will be able to describe the different parts of their instrument.

Syllabus and course of reading

(a) Three Drut Khayals with allaps and Taans in each of the Ragas prescribed in the syllabus.

(1) Hameer (2) Vrindavani Sarang (3) Bhairav

(b) Ability to sing any one vilambit Khayal with taans in any of the prescribed ragas.

(c) Ability to sing one Bhajan with Harmonium.

(d) Ability to play the Thah and dugun on hand of the following Talas with reciting Bols.

(1) Ek Taal (2) Chautaal

(e) Tuning of Taanpura

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2021-22

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Music (Vocal) IIIrd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMV 231A	Principals of Indian Classical Music –I (Theory)	2+0+0	2	3 Hours	40		10	50
	BMV 231B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music (Vocal) IVth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMV 241A	Principals of Indian Classical Music-II (Theory)	2+0+0	2	3 Hours	40		10	50
	BMV 241B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. MUSIC (VOCAL)
SEMESTER: IIIrd

BMV 231A Principles of Indian Classical Music-I (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to define the ragas and Talas.

2 The students will be able to describe the various theoretical terms of Indian classical music.

3 The students will be able to analyze the concept of Hindustani music in detail.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

Syllabus and Course of reading

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one vilambit Khayal in the prescribed Ragas.

(c) Ability to write the notation of each Drut Khayal in the following Ragas:

(1) Shudh Sarang (2) Malkauns (3) Jaijaiwanti

(d) Ability to write Thekas with dugun and chaugun in the following Talas:

(1) Jhaptaal (2) Ada Chautaal.

SECTION-B

(a) Definition of the followings:

Thumri, Tappa, Avirbhaav, Tirobhaav,Aalap, Gram, Murchna,Vagyakaar, Alpatav - Bahutv, Aandolan

(b) Difference between Margi-Desi Sangeet.

(c) Describe in detail about Raag Vargikaran.

SECTION-C

(a) Role of Music in national Integration.

(b) Different Gharana's of Khayal Gayan.

(c) Contribution towards Music by the followings:

(1) Miyan Tansen (2) Ustad Bade Gulam Ali Khan

B.A. MUSIC (VOCAL)
SEMESTER: IIIrd
BMV 231B Stage Performance & Viva

Credit: 2
Time: 15-20min/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to perform vilambit and dhrut Khayal in detail.

2 The students will be able to demonstrate taals in different layakaries with reciting bols.

3 The Students will be able to perform the different styles of light music.

Syllabus and Course of reading

(a) One Vilambit Khayal with Aalaps and Taans in any one of the raga prescribed in the syllabus.

(b) Ability to sing Drut Khayals with aalaps and Taans in all of the prescribed Ragas.

(c) One Tarana in any of the prescribed Ragas.

(d) Ability to demonstrate taal Jhaptaal and Ada Chautaal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) One Saraswati Vandna with Harmonium will be presented.

B.A. MUSIC (VOCAL)
SEMESTER: IVth

BMV 241A Principles of Indian Classical Music-II (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to explain new ragas and Talas

2 The students will be able to expound the terminologies of Indian classical music.

3 The students will be able to describe ancient history and contribution of renowned Musicians of Hindustani music.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

Syllabus and Course of reading

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Vilambit Khayal in the prescribed Ragas.

(c) Ability to write the notation of all Drut Khayals in the following Ragas:

(1) Bhairavi (2) Kedar (3) Asawari

(c) Ability to write the Thekas with dugun and Chaugan Layakaries in the following Talas:

(1) Tivra (2) Sooltaal

SECTION-B

(a) Definitions of the following:

Geet, Bhajan,Shabad, Folk Song, Filmi Geet,kajri, Chaiti, bhatiali

(b) Write in detail about Sahayak Naad (Syambhu Swar).

(c) Merits and Demerits of Notation System.

SECTION-C

(a) Detail study of the following ancient text.

(1) Natya Shastra (2) Sangeet Ratnakar.

(b) History of music in Medieval Period.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Bhimsain Joshi (2) Pt. Jasraaj

B.A. MUSIC (VOCAL)
SEMESTER: IVth

BMV 241B Stage Performance & Viva

Credit: 4
Time: 15-20min/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1. The students will be able to exhibit ragas prescribed in the syllabus.

2. The students will be able to perform the taals and their layakaries with reciting bols on hand.

3. The Students will be able to perform one Geet.

Syllabus and Course of reading

(a) One Vilambit Khayal with Aalaps and Taans in any one of the raga prescribed in the syllabus.

(b) Ability to sing Drut Khayal with aalap and Taan in all of the prescribed Ragas.

(c) One Dhrupad in any of the prescribed Ragas.

(d) Ability to demonstrate Tivra And Sooltaal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) One Geet will be presented.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by the teachers

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Music (Vocal) Vth Semester
Discipline Specific Elective (DSE)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	BMV 351A	Principles of Indian Classical Music-I (Applied Theory) –I (Theory)	2+0+0	2	3 Hours	40		10	50
	BMV 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			10	6		40	80	30	150

B.A. Music (Vocal) VIth Semester
Discipline Specific Elective (DSE)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMV 361A	Principles of Indian Classical Music-II (Applied Theory) -II (Theory)	2+0+0	2	3 Hours	40		10	50
	BMV 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			10	6		40	80	30	150

B.A. MUSIC (VOCAL)
SEMESTER: Vth

BMV 351A Principles of Indian Classical Music-I (Applied Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to explain the notations of ragas and talas prescribed in the syllabus.

2 The students will be able to describe the role of music in different aspects.

3 The students will be able to elaborate the Hindustani music in detail and also the contribution of renowned Musicians of Hindustani music.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

Syllabus and Course of reading

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Vilambit Khayal in the prescribed Ragas.

(c) Ability to write the notation of all Drut Khayal in the following Ragas:

(1) Todi (2) Miyan ki Malhar (3) Darbari

(c) Ability to write Thekas with dugun, Tigun And Chaugun in the following Talas:

(1) Dadra (2) Tilwara (3) Deepchandi

SECTION-B

(a) Definition of the following:

Nibaddh Gaan, Anibaddh Gaan, Aalapti,Jaati Gayan, Prabandh Gayan,Dhrupad, Dhamaar

(b) Lalit Kalaon main Sangeet ka sthan.

(c) Role of Music in International Cultural Exchange.

SECTION-C

(a) Describe in detail about role of string instruments in Indian classical music.

(b) Origin and development of Indian Orchestra.

(c) Contribution towards music by following:

(1) M.S.Subbulakshmi (2) Girija Devi

B.A. MUSIC (VOCAL)
SEMESTER: Vth

BMV 351B Stage Performance & Viva

Credit: 4
Time: 15-20min/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the Vilambit Khayal and Drut Khayal with aalaps and Taans prescribed in the syllabus.

2 The students will be able to play taals and their Layakaries with reciting bols on hand.

3 The Students will be able to perform thumri.

Syllabus and Course of reading

(a) One Vilambit Khayal with Aalap and Taans in any one of the raga prescribed in the syllabus.

(b) Ability to sing Drut Khayal Aalap and Taans in all of the prescribed Ragas.

(c) One Sargam Geet in any of the prescribed Ragas.

(d) Ability to demonstrate taal Dadra,Tilwara and Deepchandi by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) Ability to demonstrate any one taal by hand in Thah, Dugun, Tigun and Chaugun Layakaries with reciting bols as prescribed in the syllabus.

(f) One Thumri will be presented.

B.A. MUSIC (VOCAL)
SEMESTER: VIth

BMV 361A Principles of Indian Classical Music-II (Applied Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to comprehend the notations of ragas and talas prescribed in the syllabus.

2 The students will be able to define the terms of western music as well as ancient text of Hindustani classical music.

3 The students will be able to describe the Hindustani music in detail and also the contribution of renowned Musicians of Hindustani music.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

Syllabus and Course of reading

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Vilambit Khayal of the ragas prescribed in the syllabus.

(c) Ability to write the notation of any all Drut Khayals in the following Ragas:

(1) Kamod (2) Bheemplasi (3) Bihag

(d) Ability to write Thekas with dugun, Tigun And Chaugun Laykaris in the following Talas:

(1) Dhamaar (2) Roopak (3) Jhoomra

SECTION-B

(a) Define of the following

Harmony, Melody, Major Tone, Minor Tone, Time Signature, Consonance, Dissonance,

(b) Detail study of the following ancient text:

(1) Sangeet parijat (2) Brihaddeshi

(c) Raag ke Lakshan.

SECTION-C

(a) Development of Indian classical music during Modern Period.

(b) Difference between Hindustani and Karanatak sangeet paddhti?

(c) Contribution towards Music by the following Musicians:

(1) Pt. Rajan - Sajan Mishra (2) Ustad Rashid Khan

B.A. MUSIC (VOCAL)
SEMESTER: VIth

BMV 361B Stage Performance & Viva

Credit: 4
Time: 15-20min/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the Vilambit Khayal and Drut Khayal with aalaps and taans prescribed in the syllabus.

2 The students will be able to demonstrate taals and their Layakaries with reciting bols on hand.

3 The Students will be able to perform patriotic song.

(a) One Vilambit Khayal with Aalaps and Taans in any one of the raga prescribed in the syllabus.

(b) Ability to Sing Drut Khayal With aalaps and Taans in all of the prescribed Ragas.

(c) One Petriotic Song with harmonium will be presented.

(d) Ability to demonstrate Taal Dhamaar, Roopak and Jhoomra taal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) Ability to demonstrate any one taal by hand in Thah, Dugun, Tigun and Chaugun Layakaries with reciting bols as prescribed in the syllabus.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme and Syllabus
For IIHS
B.A. Music Instrumental (Sitar)
W.E.F Session 2020-21

According to CBCS & LOCF
(CHOICE BASED CREDIT SYSTEM & LEARNING OUTCOME BASED CURRICULUM FRAMEWORK)

KURUKSHETRA UNIVERSITY
KURUKSHETRA
2020-21

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Music Instrumental (Sitar) Ist Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMS 111A	Basic Principles of Indian Classical Music –I (Theory)	2+0+0	2	3 Hours	40		10	50
	BMS 111B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music Instrumental (Sitar) IInd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMS 121A	Basic Principles of Indian Classical Music –II (Theory)	2+0+0	2	3 Hours	40		10	50
	BMS 121B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

SYLLABUS AND COURSES OF READING

B.A. Music Instrumental (Sitar) Semester-1

Paper -1
BMS 111A : Basic Principles of Indian Classical Music-I(Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the Ragas and Talas.
2 The students will be able to define the terminologies of Indian classical music.

3 The students will be able to explain the rich history of Indian music and contribution renowned musician.

Syllabus and course of reading

NOTE: There shall be seven Questions in all. Question no 1 will be compulsory, objective type and covers whole syllabus. The candidate shall be required to attempt four questions, selecting one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of Raza Khani gats in the following Ragas:

(1) Yaman (2) Bhupali

(c) Ability to write Thekas with dugun in the following Talas:

(1) Teentaal (2) Kehrawa

SECTION-B

(a) Short notes on the followings:

Sangeet,Swar,Alankaar,Saptak,Raag,Thaat,Jaati, Vaadi Samvaadi Vivadi Anuvadi VarjitSwar , Taal, Gat,Tora,Sthai - Antra.

(b) Describe in detail about V.N Bhatkhande's Notation System.

(c) Relationship between Folk and Classical Music.

SECTION-C

(a) History of India Music from Vedic period to 12th Century.

(b) Contribution towards Music by the followings:

(1) V.N. Bhatkhande (2) V.D. Palustkar

(c) Detailed study of the following Instruments.

(1) Sitar (2) Guitar

B.A. Music Instrumental (Sitar), Semester-1st

Paper: 2
BMS 111B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1. The students will be able to exhibit the techniques of Playing.
2 .The students will be able to demonstrate ragas and taalas.
3 .The students will be able to tune their particular Instrument.

Syllabus and course of reading

(a) Two Drut Gats with Toras in each of the Ragas prescribed in the syllabus.

(b) Ability to play any Five basic alankars in Shudh Swaras.

(c) Ability to demonstrate Teental and Kehrawa by hand in Thah and Dugun Layakaries with reciting bols.

(d) Ability to play National Anthem on Sitar .

(e) Tuning of Sitar.

B.A. Music Instrumental (Sitar) Semester- 2nd

Paper -1
BMS 121A : Basic Principles of Indian Classical Music-II (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe Ragas and Talas in detail.

2 The students will be able to illustrate the historical trends of Indian classical music.

3 The students will be able to describe the various theoretical aspects of Indian classical music.

Syllabus and course of reading

NOTE: There shall be seven Questions in all. Question no 1 will be compulsory, objective type and covers whole syllabus. The candidate shall be required to attempt four questions, selecting one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of Any one Maseetkhani Gat in any Ragas prescribed in syllabus.

(c) Ability to write the notation of Raza Khani Gats in the following Ragas:

(1) Hameer (2) Vrindavani Sarang (3) Bhairav

(d) Ability to write the Thekas with dugun Layakaries in the following Talas:

(1) Ek Taal (2) Chautaal

SECTION-B

(a) Short notes on the following:

Naad,Shruti,Varan,Aavartan,Jhala,Soot,Meend,Ghaseet,Jamjama, Kan, Khatka, Murki,Krintan,Gamak, Laya.

(b) Classification of Indian Musical Instruments.

(c) Concept of Time Theory in Indian Classical Music.

SECTION-C

(a) Role of Media in the development of Indian Classical Music.

(b) Sitar Vadakon ke Gun-Dosh.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Ravi Shankar (2) Ustad Vilayat Khan

B.A. Music Instrumental (Sitar) Semester- 2nd

Paper: 2
BMS 121B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1. The students will be able to demonstrate ragas.
2. The students will be able to play taalas on hand.
3. The Students will be able to describe the different parts of their instrument.

Syllabus and course of reading

(a) Three Drut Gats with Tora's and Jhala in each of the Ragas prescribed in the syllabus.
(b) Ability to play any one vilambit gat with toras in any of the prescribed ragas.
(c) Ability to play one dhun on Sitar/Guitar.
(d) Ability to play Thah and dugun on hand of the following Talas with reciting Bols.
(1) Ek Taal (2) Chautaal
(e) Tuning of Sitar .

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Music Instrumental (Sitar) IIIrd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMS 231A	Principles of Indian Classical Music -I (Theory)	2+0+0	2	3 Hours	40		10	50
	BMS 231B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music Instrumental (Sitar) IVth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BMS 241A	Principles of Indian Classical Music -II (Theory)	2+0+0	2	3 Hours	40		10	50
	BMS 241B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music Instrumental (Sitar) Semester-IIIrd

Paper -1
BMS 231A : Principles of Indian Classical Music-I (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to define the ragas and Talas.

2 The students will be able to describe the various theoretical terms of Indian classical music.

3 The students will be able to analyze the concept of Hindustani music in detail.

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Maseetkhani Gat in the prescribed Ragas.

(c) Ability to write the notation of each Razakhani Gat in the following Ragas:

(1) Shudh Sarang (2) Malkauns (3) Jaijaiwanti

(d) Ability to write Thekas with dugun in the following Talas:

(1) Jhaptaal (2) Ada Chautaal.

SECTION-B

(a) Definition of the followings:

Thumri, Tappa, Avirbhaav - Tirobhaav, Aalap, Gram, Murchna, Vagyakaar, Alpatav-Bahutv, Aakarsh, Apkarsh - Prahaar, Sitar ke bol,Aandolan

(b) Difference between Margi-Deshi Sangeet.

(c) Describe in detail about Raag Vargikaran.

SECTION-C

(a) Role of Music in national Integration.

(b) Different Gharana's of Sitar Vadan.

(c) Contribution towards Music by the followings:

(1) Pt. Pannalal Ghosh (2) Pt. Buddhaditya Mukherjee

B.A. Music Instrumental (Sitar), Semester-IIIrd
Paper: 2

BMS 231B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to perform vilambit and drut gats in detail.

2 The students will be able to demonstrate taals in different layakaries with reciting bols.

3 The Students will be able to perform the different styles of light music.

Syllabus and course of reading

(a) One Maseetkhani Gat with Toda's in any one of the raga prescribed in the syllabus.

(b) Ability to play Razakhani Gats with Toda's in all of the prescribed Ragas.

(c) Ability to play Jhala in any raga prescribed in the syllabus.

(d) Ability to demonstrate taal Jhaptaal and Ada Chautaal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) Vande Matram on sitar or Guitar will be presented.

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B.A. Music Instrumental (Sitar) Semester-IVth

Paper -1
BMS 241A : Principles of Indian Classical Music-II (Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to explain new ragas and Talas .

2 The students will be able to expound the terminologies of Indian classical music.

3 The students will be able to describe ancient history and contribution of renowned Musicians of Hindustani music.

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Maseetkhani Gat in the prescribed Ragas.

(c) Ability to write the notation of each Razakhani Gat in the following Ragas:

(1) Bhairavi (2) Kedar (3) Asawari

(d) Ability to write the Thekas with dugun and Chogun Layakaries in the following Talas:

(1) Tivra (2) Sooltaal

SECTION-B

(a) Definitions of the following:

Geet, Bhajan, Shabad, Folk Song,Filmi Geet,kajri, Chaiti, bhatiali.

(b) Write in detail about Sahayak Naad (Syambhu Swar).

(c) Merits and Demerits of Notation System.

SECTION-C

(a) Detail study of the following ancient text.

(1) Natya Shastra (2) Sangeet Ratnakar.

(b) History of music in Medieval Period.

(c) Contribution towards Music by the following Musicians:

(1) Ustad Amzad Ali Khan (2) Ustad Sujat Khan

B.A. Music Instrumental (Sitar), Semester-IVth

Paper: 2
BMS 241B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit ragas prescribed in the syllabus.

2 The students will be able to perform the taals and their layakaries with reciting bols on hand.

3 The Students will be able to perform one Geet.

Syllabus and course of reading

(a) One Maseetkhani Gat with Toda's in any one of the raga prescribed in the syllabus.

(b) Ability to play Razakhani Gats with Toda's in all of the prescribed Ragas.

(c) One Sargam Geet in any of the prescribed Ragas.

(d) Ability to demonstrate Tivra And Sooltaal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) One Geet on sitar will be presented.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Music Instrumental (Sitar) Vth Semester
Discipline Specific Elective(DSE)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Elective (DSE)	BMS 351A	Principles of Indian Classical Music-I (Applied) Theory)	2+0+0	2	3 Hours	40		10	50
	BMS 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music Instrumental (Sitar) VIth Semester
Discipline Specific Elective(DSE)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Elective (DSE)	BMS 361A	Principles of Indian Classical Music-II (Applied Theory)	2+0+0	2	3 Hours	40		10	50
	BMS 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Music Instrumental (Sitar) Semester-5th

Paper -1
BMS 351A : Principles of Indian Classical Music-I (Applied Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to explain the notations of ragas and talas prescribed in the syllabus.

2 The students will be able to describe the role of music in different aspects.

3 The students will be able to elaborate the Hindustani music in detail and also the contribution of renowned Musicians of Hindustani music.

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Maseetkhani Gat of the ragas prescribed in the syllabus.

(c) Ability to write the notation of all Razakhani Gats in the following Ragas:

(1) Todi (2) Miyan ki Malhar (3) Darbari

(c) Ability to write Thekas with dugun, Tigun And Chaugun Laykaris in the following Talas:

(1) Dadra (2) Tilwara (3) Deepchandi

SECTION-B

(a) Definition of the following:

Nibaddh Gaan, Anibaddh Gaan, Aalapti,Jaati Gayan, Prabandh Gayan,Dhrupad, Dhamaar

(b) Lalit Kalaon main Sangeet ka Sthan.

(c) Role of Music in International Cultural Exchange.

SECTION-C

(a) Describe in detail about role of string instruments in Indian classical music.

(b) Origin and development of Indian Orchestra.

(c) Contribution towards music by following:

(1) Nikhil Banerjee (2) Annapurna Devi

B.A. Music Instrumental (Sitar), Semester-5th
Paper: 2

BMS 351B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to perform the maseetkhani gats and razakhani gats with Jor aalaps and toras prescribed in the syllabus.

2 The students will be able to play taals and their Layakaries with reciting bols on hand.

3 The Students will be able to perform thumri.

(a) One Maseetkhani Gat with Jor Aalap's and Toda's in any one of the raga prescribed in the syllabus.

(b) Ability to play Razakhani Gats with Toda's and Jhala's in all of the prescribed Ragas.

(c) One Sargam Geet in any of the prescribed Ragas.

(d) Ability to demonstrate taal Dadra,Tilwara and Deepchandi by hand in Thah, Dugun and Chogun Layakaries with reciting bols.

(e) Ability to demonstrate any one taal by hand in Thah, Dugun, Tigun and Chaugun Layakaries with reciting bols as prescribed in the syllabus.

(f) One Thumri on sitar will be presented.

B.A. Music Instrumental (Sitar) Semester-6th

Paper -1
BMS 361A : Principles of Indian Classical Music-II (Applied Theory)

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to comprehend the notations of ragas and talas prescribed in the syllabus.

2 The students will be able to define the terms of western music as well as ancient text of Hindustani classical music.

3 The students will be able to describe the Hindustani music in detail and also the contribution of renowned Musicians of Hindustani music.

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Maseetkhani Gat of the ragas prescribed in the syllabus.

(c) Ability to write the notation of Razakhani Gats in all the following Ragas:

(1) Kamod (2) Bheemplasi (3) Bihag

(d) Ability to write Thekas with dugun, Tigun And Chaugun Laykaris in the following Talas:

(1) Dhamaar (2) Roopak (3) Jhoomra

SECTION-B

(a) Define of the following

Harmony, Melody, Major Tone, Minor Tone, Time Signature, Consonance, Dissonance,

(b) Detail study of the following ancient text:

(1) Sangeet parijat (2) Brihaddeshi

(c) Raag ke Lakshan.

SECTION-C

(a) Development of Indian classical music during Modern Period.

(b) Difference between Hindustani and Karanatak sangeet paddhti?

(c) Contribution towards Music by the following Musicians:

(1) Pt. Shiv Kumar Sharma (2) Ustad Shahid Parvez

B.A. Music Instrumental (Sitar), Semester-6th
Paper: 2

BMS 361B : Stage Performance & Viva (Practical)

Credit: 4
Time: 15-20min/ Student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the maseetkhani and razakhani gats with Jhalas and toras prescribed in the syllabus.

2 The students will be able to demonstrate of taals and their Layakaries with reciting bols on hand.

3 The Students will be able to perform patriotic song.

Syllabus and course of reading

(a) One Maseetkhani Gat with Toda's in any one of the ragas prescribed in the syllabus.

(b) Ability to play Razakhani Gat with Jor aalap and Toda's in all of the prescribed Ragas.

(c) One Patriotic Song will be presented.

(d) Ability to demonstrate Taal Dhamaar, Roopak and Jhoomrataal by hand in Thah, Dugun and Chogun Layakaries with reciting bols.

(e) Ability to demonstrate any one taal by hand in Thah, Dugun, Tigun and Chaugun Layakaries with reciting bols as prescribed in the syllabus.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharmajhq

9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by the teachers

DEPARTMENT OF MUSIC AND DANCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme and Syllabus
For IIHS
B.A. Honours Music
W.E.F Session 2020-21

According to CBCS & LOCF
(CHOICE BASED CREDIT SYSTEM & LEARNING OUTCOME BASED CURRICULUM FRAMEWORK)

KURUKSHETRA UNIVERSITY
KURUKSHETRA
2020-21

Programme Outcomes (PO) of Bachelor of Arts (Honours) CBCS Programmes/Courses in the Institute of Integrated and Honours Studies, Kurukshetra University, Kurukshetra

PO 1: Demonstrate a detailed knowledge and understanding of selected fields of study in core disciplines in the humanities, social sciences and languages;

PO 2: Apply critical and analytical skills and methods to the identification and resolution of problems within complex changing social contexts.

PO 3: Demonstrate a general understanding of the concepts and principles of selected areas of study outside core disciplines of the humanities, social sciences and languages;

PO 4: Apply an independent approach to knowledge that uses rigorous methods of inquiry and appropriate theories;

PO 5: Articulate the relationship between diverse forms of knowledge and the social, historical and cultural contexts that produced them;

PO 6: Communicate effectively and and show ability to read, write, listen to and speak in a chosen language/s with fluency;

PO 7: Act as informed and critically discerning participants within the community of scholars, as citizens and in the work force;

PO 8: Work with independence, self-reflection and creativity to meet goals and challenges in the workplace and personal life.

PSO"S of B.A.(Hons)Music

1. Constructs Strong foundation of Music.
2. Ensures specialised training and employability after graduation.
3. Imparts knowledge about recording studio and others technical areas of music.
4. Prepares for higher studies and research.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

B.A. (Honours) Ist Semester

Papers Category	Course Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BHM 111	Musicology and Applied Theory -I	6+0+0	6	3 Hours	120		30	150
	BHM 112	Stage performance & viva (Practical)	0+0+12	6	15 -20 min / Student		120	30	150
Total			6+0+12	6		120	120	60	300

B.A. (Honours) IInd Semester

Papers Category	Course Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BHM 121	Musicology and Applied Theory -II	6+0+0	6	3 Hours	120		30	150
	BHM 122	Stage performance & viva (Practical)	0+0+12	6	15 -20 min / Student		120	30	150
Total			6+0+12	6		120	120	60	300

SYLLABUS AND COURSES OF READING

B.A. Honours (Music)
SEMESTER: 1st

Paper- 1
BHM 111 : Musicology and Applied Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to describe the Ragas and Talas in detail.
2 The students will be able to define the terminologies of Indian classical music.

3 The students will be able to explain the rich history of Indian music and the contribution of renowned musicians.

Syllabus and course of reading

NOTE: There shall be ten Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. Question no one is compulsory objective type and will covers whole syllabus. All questions carry equal marks .

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b)Ability to write the notation of Razakhani Gats/Drut Khayals in the following Ragas.

(1) Yaman (2) Bhupali

(c) Ability to write Thekas with dugun in the following Talas:

(1) Kehrawa (2) Teentaal.

(d) Comparison between the Ragas prescribed in the syllabus.

(e) Comparison between the Talas prescribed in the syllabus.

SECTION-B

(a) Definition of the followings:
Sangeet,Swar,Alankaar,Aaroh,Avroh,Pakad,Saptak,Raag,Thaat,Jaati,Vaadi,Samvaadi, Vivadi,Anuvadi,Varjit Swar,Khayal,Taal,Taan, Sthai,Antra,Gat,Tora.

(b) History of India Music from Vedic period to 12th Century.

(c) Detailed study of the following Instruments.

(1) Tanpura (2) Sitar

SECTION-C

(a) Relationship of Folk and Classical Music.

(b) Contribution towards Music by the followings:

(1) V.N Bhatkhande (2) V.D Palustkar

(c) Describe in detail about V.N Bhatkhande's Notation System.

B.A. Honours (Music) Semester- 1st
Paper -2

BHM 112 Stage performance & viva (Practical)

Credit: 06
Time: 15-20min/Student **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of Singing/playing.

2 The students will be able to demonstrate ragas, alankars and taals.

3 The students will be able to tune their particular Instrument.

Syllabus and course of reading

(a) Two Drut Khayal's/Drut Gats with Taan/Tora's in each of the Ragas prescribed in the syllabus.

(b) Ability to play/sing any Five basic alankars in Shudh Swaras.

(c) Ability to demonstrate Teental and Kehrawa by hand in Thah and Dugun Layakaries with reciting bols.

(d) Ability to play/sing National Anthem on Harmonium/Sitar/.

(e) Tuning of your particular instrument Tanpura/Sitar.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by the teachers.

B.A. Honours (Music) SEMESTER: 2nd
Paper- 1

BHM 121: Musicology and Applied Theory-II

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to describe Ragas and Talas in detail.
2 The students will be able to define the terminologies of Indian classical music.

3 The students will be able to explain the rich history of Indian classical music and the contribution of artists in the field of music.

Syllabus and course of reading

NOTE: There shall be ten Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. Question no one is compulsory objective type and will covers whole syllabus. All questions carry equal marks .

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to Write the notation of any one Vilambit Khayal/Maseetkhani Gat in any of the prescribed ragas.

(c) Ability to write the notation of all Drut Khayals/Razakhani Gats in the following Ragas:

(1) Hameer (2) Vrindavani Sarang (3) Bhairav

(d) Ability to write the Thekas with dugun Layakaries in the following Talas:

(1) Ektaal (2) Chautaal

(e) Comparison between the Ragas prescribed in the syllabus.

(f) Comparison between the Talas prescribed in the syllabus.

SECTION-B

(a) Short notes on the following:

Naad,Shruti,Varna,Aavartan,Tarana,Nayak-Nayiki,Kan,Khatka,Murki,Gamak,Aalap,Gayak-Gayaki,Lakshan Geet, Aandolan, Laya, Jhala, Soot, Meend, Ghaseet, Jamjama, Krintan.

(b) Classification of Indian Musical Instruments.

(c) Concept of Time Theory in Indian Classical Music.

SECTION-C

(a) Role of Media in the development of Indian Classical Music.

(b) Sitar Vadakon Tatha Khayal Gayakon ke Gun-Dosh.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Omkarnath Thakur (2) Ustad Abdul Karim Khan

(3) Pt. Ravi Shankar (4) Ustad Vilayat Khan

B.A. Honours (Music) SEMESTER: 2nd
Paper-2

BHM 122 : Stage performance & viva (Practical)

Credit: 06
Time: 15-20min/Student **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the ragas and taals.

2 The students will be able to present any bhajan and dhun on sitar/ guitar / harmonium.

3 The students will be able to tune their particular Instrument.

Syllabus and course of reading

(a) Three Drut Khayals/Gats with alaps/Jhala and Taans/Toras in each of the Ragas prescribed in the syllabus.

(b) Ability to sing/Play any one vilambit Khayal /Vilambit Gat with taans/Toras in any of the prescribed ragas.

(c) Ability to sing/play one Bhajan/Dhun on sitar/Harmonium.

(e) Ability to play the ekgun and dugun on hand of the following Talas with reciting Bols.

(1) Ek Taal (2) Chautaal

(f) Tuning of particular instrument

(1) Taanpura (2) Sitar

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7.Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10.Also Books Recommended by teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2021-22

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

B.A. (Honours) IIIrd Semester

Papers Category	Course Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BHM 231	Musicology and General Theory -I	6+0+0	6	3 Hours	120		30	150
	BHM 232	Musicology and Applied Theory -I	6+0+0	6	3 Hours	120		30	150
	BHM 233	Stage performance & viva (Practical)	0+0+12	6	15 -20 min / Student		120	30	150
Total			6+0+12	6		120	120	60	300

B.A. (Honours) IVth Semester

Papers Category	Course Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BHM 241	Musicology and General Theory -II	6+0+0	6	3 Hours	120		30	150
	BHM 242	Musicology and Applied Theory -II	6+0+0	6	3 Hours	120		30	150
	BHM 243	Stage performance & viva (Practical)	0+0+12	6	15 -20 min / Student		120	30	150
Total			6+0+12	6		120	120	60	300

B.A. Honours (Music) SEMESTER: 3rd

Paper- 1
BHM 231 : Musicology and General Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome
1 The students will be able to define the ragas and Talas.
2 The students will be able to describe the various theoretical terms of Indian classical music.

3 The students will be able to analyze the concept of Hindustani music in detail.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one vilambit Khayal/Maseetkhani gat in the prescribed Ragas.

(c) Ability to write the notation of each Drut Khayals/Razakhani Gats in the following Ragas:

(1) Shudh Sarang (2) Malkauns (3) Jaijaiwanti

(d) Ability to write Thekas with dugun and Chaugun in the following Talas:

(1) Jhaptaal (2) Ada Chautaal.

(e) Comparison between the Ragas prescribed in the syllabus.

(f) Comparison between the Talas prescribed in the syllabus.

SECTION-B

(a) Definition of the followings:

Thumri, Tappa, Avirbhaav, Tirobhaav, Shruti, Gram, Murchna, Alpatav - Bahutav, Vagyakaar, Jor Allap,Aakarsh - Apkarsh Prahaar, Sitar ke bol.

(b) Difference between Margi-Desi Sangeet.

(c) Role of Music in national Integration.

SECTION-C

(a) Describe in detail about Raag Vargikaran.

(b) Different Gharana's of Khayal Gayaki/Sitar Vaadan .

(c) Contribution towards Music by the followings:

(1) Miyan Tansen (2) Ustad Bade Gulam Ali Khan

(3) Pt.Pannalal Ghosh (4) Pt. Buddhaditya Mukherjee

B.A. Honours (Music)
SEMESTER: 3rd

Paper- 2
BHM 232 : Musicology and Applied Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1. The students will be able to describe the various theoretical terms of Indian classical music.

2 The students will be able to explain the pioneering work done by the legends of Hindustani music as well as ancient text.

3. The students will be able to explain the terminologies of Indian classical music.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Short notes on the following

(1) Harmony (2) Melody (3) Jaati Gayan (4) Prabandh Gayan (5) Major Tone (6) Minor Tone (7) Dhrupad (8) Dhamaar

(b) Development of Indian classical music during Medieval Period.

(c) Difference between Hindustani and Karanatak sangeet paddhti?

SECTION-B

(a) Contribution towards Music by the following Musicians:

(1) Pt. Rajan - Sajan Mishra (2) Pt. Ajay Chakraborty

(3) Pt. Shiv Kumar Sharma (4) Ustad Shahid Parvez

(b) Short notes on the following ancient text:

(1) Natya Shastra (2) Sangeet Ratnakar.

(c) Raag ke Lakshan.

SECTION-C

(a) Difference between the following:

(1) Kajri - Chaiti (2) Dadra - Sadra (3) Gazal - Qawwali

(b) Relation between Raag And Ras

(c) Importance of Aesthetics in Indian Music.

B.A. Honours (Music)
SEMESTER: 3rd

Paper- 3
BHM 233 : Stage performance & viva (Practical)

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to perform vilambit and drut Khayal / Maseetkhani and Rajakhani gat in detail.

2 The students will be able to demonstrate taals in different layakaries with reciting bols.

3 The Students will be able to perform the different styles of light music.

(a) One Vilambit Khayal/Maseetkhani Gat with Aalaps and Taans/Toras in any one of the raga prescribed in the syllabus.

(b) Ability to sing Drut Khayals/Razakhani Gats With aalaps and Taans/Toras in all of the prescribed Ragas.

(c) Sing/Play one Tarana/Jhalla in any of the prescribed Ragas.

(d) Ability to demonstrate taal Jhaptaal and Ada Chautaal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) Vande Matram/Saraswati Vandna on Sitar/Harmonium/Guitar will be presented.

B.A. Honours (Music)
SEMESTER: 4th

Paper- 1
BHM 241 : Musicology and General Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1. The students will be able to define the ragas and Talas.
2. The students will be able to describe the various theoretical terms of Indian classical music.
3. The students will be able to explain the pioneering work done by the legends of Hindustani music as well as ancient text.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Vilambit Khayal/Maseetkhani Gat in the prescribed Ragas.

(c) Ability to write the notation of all Drut Khayals/Razakhani Gats in the following Ragas:

(1) Bhairavi (2) Kedar (3) Asawari

(d) Ability to write the Thekas with dugun and Chaugan Layakaries in the following Talas:

(1) Tivra (2) Sooltaal

(e) Comparison between the Ragas prescribed in the syllabus.

(f) Comparison between the Talas prescribed in the syllabus.

SECTION-B

(a) Definitions of the following:

Geet, Bhajan, Folk Song, Filmi Geet, Shabad, Maand, Heer, Ragini

(b) Write in detail about Sahayak Naad (Swayambhu Swar).

(c) Development of Indian classical music in Modern Period.

SECTION-C

(a) Short notes on the following ancient text.

(1) Sangeet parijat (2) Brihaddeshi

(b) Merits and Demerits of Notation System.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Bhimsen Joshi (2) Pt. Jasraaj

(3) Ustad Amjad ali Khan (4) Ustad Sujat Khan

B.A. Honours (Music)
SEMESTER: 4th

Paper- 2
BHM 242 : Musicology and Applied Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1. The students will be able to describe the various theoretical terms of Indian music as well as western music.

2 The students will be able to explain the various theoretical aspects of Indian music and contribution of renowned musicians.

3. The students will be able to define the interdisciplinary aspects of music.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Short notes on the following

(1) Kalavant - Pandit (2) Nyas - Apanyas Swar (3) Staff Notation (4) Consonance (5) Dissonance (6) Equally Tampered Scale (7) Kritanam (8) Geetam

(b) Taal ke Das Praan.

(c) Basic Theory of Western Cords.

SECTION-B

(a) Contribution towards Music by the following Musicians:

(1) Annapurna Devi (2) Nikhil Banerjee

(3) Ustad Rashid Khan (4) Pt. Channulal Mishra

(b) Short notes on the following ancient text:

(1) Swar Mel Kalaniddhi (2) Sangeet Darpan.

(c) Difference between the following:

(1) Triwat - Chaturang (2) Vrind Gaan - Vrind Vadan (3) Baoul - Bhatiyali

SECTION-C

(a) Globalization of Indian Music.

(b) Music and Spirituality

(c) Healing through music.

B.A. Honours (Music)
SEMESTER: 4th

Paper- 3
BHM 243 : Stage performance & viva (Practical)

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to perform vilambit and dhrut Khayal / Maseetkhani and Rajakhani gat in detail.

2 The students will be able to demonstrate taals in different layakaries with reciting bols.

3 The Students will be able to perform the different styles of light music and classical music.

(a) One Vilambit Khayal/Maseetkhani Gat with Aalaps and Taans/Toras in any one of the raga prescribed in the syllabus.

(b) Ability to sing Drut Khayals/Razakhani Gats With aalap and Taans/Toras in all of the prescribed Ragas.

(c) One Dhrupad/Sargam Get in any of the prescribed Ragas.

(d) Ability to demonstrate Tivra And Sooltaal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) One Bhajan will be presented.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Honours (Music) IVth Semester
Skill Enhancement Course

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Skill Enhancement Course	SECM 241	Techniques of stage performance, recording studio work and electronic media (Theory)	2+0+0	2	3 Hours	40		10	50
Total			2+0+0	2	3	40		10	50

B.A. Honours (Music) SEMESTER: IVth
Skill Enhancement Course (SEC)

SECM 241 Techniques of stage performance, recording studio work and electronic media

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the principals and techniques of recording.
2 The students will be able to explain the importance of electronic media in popularizing music.

3 The students will be able to present their performance according to the techniques of the stage.

NOTE: There shall be eight questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

Syllabus and course of reading

SECTION - A

Principles & Techniques of Recording

- Definition of Recording.
- Origin and development of recording system.
- Importance of Recording place (Open & Studio)

SECTION - B

Music and Media

- Importance of Internet in Popularizing the Indian Music.
- Role of Television in Popularizing the Indian Music.
- Description of L.P Recording, Tape Cassettes, CD/DVD, Micro Chips etc.

SECTION – C

Basic Principles of Stage Performance

- Psychology of Audience and its Relationship with the Artists.
- Relationship between Performer and accompanists.
- Modern trends of Stage performance in Indian Music.

Books Recommended

1. Sangeet Visharad- Basant
2. Kramik Pustak Mallika- Part II V. N. Bhatkhande
3. Sangeet Bodh – Sharad Chandra Pranjpayee
4. Shastriya Sangeet ka vikas – Dr. Amita Sharma
5. Mixing secrets (for the small studio) - Mike Senior
6. Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

B.A. (Honours) Vth Semester

Papers Category	Course Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BHM 351	Musicology and Applied Theory -I	6+0+0	6	3 Hours	120		30	150
	BHM 352	Stage performance & viva (Practical)	0+0+12	6	15 -20 min / Student		120	30	150
Total			6+0+12	6		120	120	60	300

B.A. (Honours) VIth Semester

Papers Category	Course Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	BHM 361	Musicology and Applied Theory -II	6+0+0	6	3 Hours	120		30	150
	BHM 362	Stage performance & viva (Practical)	0+0+12	6	15 -20 min / Student		120	30	150
Total			6+0+12	6		120	120	60	300

B.A. Honours (Music)
SEMESTER: 5th

Paper- 1
BHM 351 : Musicology and General Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1. The students will be able to define the ragas and Talas.
2. The students will be able to describe the various theoretical terms of Indian classical music.
3. The students will be able to explain the terminologies and depth of discipline.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Vilambit Khayal/ Maseetkhani Gat in the prescribed Ragas.

(c) Ability to write the notation of all Dhrut Khayals/Razakhani Gats in the following Ragas:

(1) Todi (2) Miyan ki Malhar (3) Darbari

(d) Ability to write Thekas with dugun, Tigun And Chaugun in the following Talas:

(1) Dadra (2) Tilwara (3) Deepchandi

(e) Comparison between the Ragas prescribed in the syllabus.

(f) Comparison between the Talas prescribed in the syllabus.

SECTION-B

(a) Definition of the followings:

Nibaddh Gaan, Anibaddh Gaan, Aalpti, Padam, Tillana, Kriti , Varnam , pallavi

(b) Lalit Kalaon main Sangeet ka Sthan.

(c) Role of Music in International Cultural Exchange.

SECTION-C

(a) Role of string instruments in different styles of singing.

(b) Describe in detail about Raag Vargikaran.

(c) Contribution towards music by following:

(1) M.S. Subbulakshmi (2) Girija Devi

(3) Ustad Sultan Khan (4) Ustad Alla Rakha Khan

B.A. Honours (Music)
SEMESTER: 5th

Paper- 2
BHM 352 : Stage performance & viva (Practical)

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit vilambit and dhrut Khayal / Maseetkhani and Rajakhani gat in detail.

2 The students will be able to demonstrate taals in different layakaries with reciting bols.

3 The Students will be able to perform the different styles of light music and classical music.

(a) One Vilambit Khayal/Maseetkhani Gat with Aalap and Taans/Toras in any one of the raga prescribed in the syllabus.

(b) Ability to play Drut Khayals/Razakhani Gats Aalap and Taans/Toras in all of the prescribed Ragas.

(c) One Filmy Geet in any of the prescribed Ragas.

(d) Ability to demonstrate taal Dadra,Tilwara and Deepchandi by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) Ability to demonstrate any one taal by hand in Thah, Dugun, Tigun and Chaugun Layakaries with reciting bols as prescribed in the syllabus.

(f) One Thumri will be presented.

B.A. Honours (Music)
SEMESTER: 6th

Paper- 1
BHM 361 : Musicology and General Theory-I

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1. The students will be able to define the ragas and Talas.
2. The students will be able to describe the various theoretical aspects of music.
3. The students will be able to explain the terminologies of Indian music as whole.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of any one Vilambit Khayal/Maseetkhani Gat of the ragas prescribed in the syllabus.

(c) Ability to write the notation of any all Dhrut Khayal/Razakhani Gats in the following Ragas:

(1) Kamod (2) Bheemplasi (3) Bihag

(d) Ability to write Thekas with dugun, Tigun And Chaugun Laykaris in the following Talas:

(1) Dhamaar (2) Roopak (3) Jhoomra

(e) Comparison between the Ragas prescribed in the syllabus.

(f) Comparison between the Talas prescribed in the syllabus.

SECTION-B

(a) Definition of the following:

Polyphony, Time signature , Frequency , Vibration , Force Vibration , Free Vibration, Scale , Just Intonation

(b) Difference Between Kathak - Kathakali, Kuchipudi - Oddisi , BHaratnatyam - Mohiniattam

(c) Job opportunities in the field of Music.

SECTION-C

(a) Contribution towards Music by the following Musicians:

(1) Pt. Rajan - Sajan Mishra (2) Pt. Ajay Chakraborty

(3) Pt. Vishav Mohan Bhatt (4) Pt. Birju Maharaaj

(b) Importace of Sangeet Sammelan.

(c) Folk Instruments of Punjab And Haryana.

B.A. Honours (Music)
SEMESTER: 6th

Paper- 2
BHM 362 : Stage performance & viva (Practical)

Credit: 06
Time: 3Hrs. **Max. Marks: 150 (120 + 30 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit vilambit and dhrut Khayal / Maseetkhani and Rajakhani gat in detail.

2 The students will be able to demonstrate taals in different layakaries with reciting bols.

3 The Students will be able to perform the different styles of light music and classical music.

(a) One Vilambit Khayal/Maseetkhani Gat with Aalaps and Taans/Toras in any one of the raga prescribed in the syllabus.

(b) Ability to play Drut Khayals/Razakhani Gats With aalaps and Taans/Toras in all of the prescribed Ragas.

(c) One Patriotic Song will be presented.

(d) Ability to demonstrate Taal Dhamaar, Roopak and Jhoomra taal by hand in Thah, Dugun and Chaugun Layakaries with reciting bols.

(e) Ability to demonstrate any one taal by hand in Thah, Dugun, Tigun and Chaugun Layakaries with reciting bols as prescribed in the syllabus.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr. Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Honours (Music) Vth Semester
Discipline Specific Elective (Guitar)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective	DSEG 351A	General Theory of Music –I (Theory)	2+0+0	2	3 Hours	40		10	50
	DSEG 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) VIth Semester
Discipline Specific Elective (Guitar)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective	DSEG 361A	General Theory of Music-II (Theory)	2+0+0	2	3 Hours	40		10	50
	DSEG 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Guitar)

DSEG 351A General Theory of Guitar -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the origion and development of guitar .
2 The students will be able to elubrate the terms and techniques of Guitar .

3 The students will be able to define the importance of Guitar in present scenario .

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions , selecting atleast one question from each section. All questions carry equal marks.

Section A

1. Origin and development of Guitar.
2. Structural knowledge of Guitar with Diagram.
3. Different Types of Guitar.

Section B

1 . Definition of the followings:

(a) Major Scale (b) Minor Scale (c) Barre Codes (d) Plucking (e) Scale

(f) Tempo

2. Techniques of using chords in Guitar.
3. Tuning of Guitar.

Section- C

1. Biography and contribution of following:

   (a) Pt. Vishwa Mohan Bhatt (b) Brij Bhushan Kabra

2. Importance of Guitar in Classical Music.

3. Use of Guitar in Fusion Music.

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Guitar)

DSEG 351B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of Playing.
2 The students will be able to demonstrate filmi songs and National anthem on Guitar.
3 The students will be able to tune their particular instrument .

Syllabus and course of reading

- Ability to play Five Basic alankaar on Guitar.
- Ability to play National Anthem on Guitar.
- Play/Sing one Filmi Song on Guitar.
- Tuning of Guitar.

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Guitar)

DSEG 361A General Theory of Guitar -II

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to descibe ragas and Taals .
2 The students will be able to define the termologies of indian classical music .
3 The students will be able to explain the depth of subject .

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions , selecting atleast one question from each section. All questions carry equal marks

Section A

1. Historical study & detailed description of ragas prescribed in the syllabus.

2. Ability to write the Notation of Drut Khayal of the Following:

   (a)Yaman (b) Bhupali

3. Ability to write Thekas with Dugun in the following Taals.
   (a) Kehrawa (b) Teentaal (c) Ektaal

Section – B

1. Short notes on the followings:

   Sangeet, Swar, Alankaar, Saptak, Raag, Thaat, Jati, Vadi, Samvadi, Anuvadi, Varjit Swar, Taal, Khyal, Taan, Sthai, Antra

2 . Classification of string instruments .

3 . Different techniques of playing Guitar and Mohan Veena.

Section C

1. Relationship between Guitar and Sitar.
2. Biography and contribution of following:

   (a)Vidhushi Dr. Kamala Shankar (b) Chintoo Singh
3. Role of Guitar in Light Music

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Guitar)

DSEG 361B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exibit the Ragas and Talas.
2 The students will be able to demonstrate light music on Guitar.

3 The students will be able to perform western song on Guitar.

Syllabus and course of reading

- Ability to play one Drut Khayal with aalaps & Taans
- Ability to demonstrate Kehrawa, Teentaal & Ektaal on hand with Dugun and Chaugun.
- Ability to Play and sing one Bhanjan
- Ability to Play and Sing one Western Song.
- Ability to Sing filmi song on Guitar.

Books Recommended

1. Bhartiya Sangeet me Guitar vadya - Ranjan Kumar
2. Guitar vadya ki vibhinn vadan shailiyaan - Dr. Anupama Kumari
3. Sangeet Bodh – Sharad Chandra Pranjpayee
4. Raag Parichay Part (1-2) - Harishchand Shrivastav
5 . .Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Honours (Music) Vth Semester
Discipline Specific Elective (Harmonium)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSEH 351A	General Theory of Harmonium – I (Theory)	2+0+0	2	3 Hours	40		10	50
	DSEH 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) VIth Semester
Discipline Specific Elective (Harmonium)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	DSEH 361A	General Theory of Harmonium-II (Theory)	2+0+0	2	3 Hours	40		10	50
	DSEH 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (DSE) Harmonium

DSEH 351A General Theory of Harmonium-I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the Ragas and Talas.
2 The students will be able to define the terminologies of Indian classical music.

3 The students will be able to explain the rich history of Harmonium and the contribution of renowned musician.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b)Ability to write the notation of Drut Khayals in the following Ragas:

(1) Yaman (2) Bhupali

(c) Ability to write Thekas with dugun in the following Talas:

(1) Kehrawa (2) Teentaal.

SECTION-B

(a) Short notes on the followings:

Sangeet,Swar,Alankaar,Saptak,Raag,Thaat,Jaati,Vaadi Samvaadi, Vivadi ,Anuvadi Varjit Swar, Taal, Khayal, Taan, Sthai - Antra.

(b) Structural knowledge of Harmonium with a sketch

(c) Detailed history of Harmonium and its development in Indian music

SECTION-C

(a) . Importance of Harmonium in Haryanvi folk music

(b) Use of Harmonium as an Accompaniment with vocal and instrumental music

(c) Biography and contribution of the following :

(1) Ustad Bhure khan (2) Ustad Mahmood Dholpuri

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (DSE) Harmonium

DSEH 351B Stage Performance & Viva

Credit: 2
Time: 3Hrs. **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of playing.

2 The students will be able to demonstrate ragas and taalas.

3 The students will be able to play Nagma on Harmonium

(a) Ability of play Alankar.

(b) Ability to play drut Khyal with aalaps and taans of prescribe syllabus.

(c) Ability to play National Anthem on Harmonium.

(d) Play one dhun on Harmonium.

(e) Play Nagma in Teen taal

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (DSE) Harmonium

DSEH 361A General Theory of Harmonium

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome
1 The students will be able to describe Ragas and Talas in detail.

2 The students will be able to define the terminologies of Indian classical music.

3 The students will be able to describe the rich history of harmonium.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of all Drut Khayals in the following Ragas:

(1) Charukeshi (2) Kaafi

(c) Ability to write the Thekas with dugun Layakaries in the following Taals:

(1) Ek Taal (2) Dadra

SECTION-B

(a) Short notes on the following:

Naad,Shruti,Varan,Aavartan,Tarana, Kan,Khatka,Murki,Gamak,Aalap,Lakshan Geet,Laya.

(b) Importance of Harmonium in Light Music.

(c) Use of Harmonium in Classical Music.

SECTION-C

(a) Playing techniques of Harmonium.

(b) Description of different types of Harmoinium.

(c) Biography and contribution by the following Musicians:

(1) Pt. Dinkar Sharma (2) Bhaiya Ganpat Rao

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (DSE) Harmonium

DSEH 361B Stage Performance & Viva

Credit: 4
Time: 3Hrs. **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of playing.

2 The students will be able to demonstrate ragas and taals.

3 The Students will be able to play Nagma on harmonium.

(a) Ability to play Drut Khayals with allaps and Taans in each of the Ragas prescribed in the syllabus.

(b) Ability to play any song, Geet , Gazal , Bhajan Patroitic song on Harmonium with singing.

(c) Ability to play Shuddha and Vikrit Swaras on Harmonium.

(d) Playing of 5 Alankaar in any basic Thaat (Raag)

(e) Ability to play Nagma (Lehra) in Ektaal

Books Recommended

1. Samvadini (Harmonium) - Jayant Bhalodkar

2. Harmonium Vividhaayam - Dr. Vinay Mishra

3. Raag Parichay Part (1-2) - Harishchand Shrivastav

4. Shastriya Sangeet ka vikas – Dr. Amita Sharma

5. Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Honours (Music) Vth Semester
Discipline Specific Elective (DSE) Sitar

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSES 351A	General Theory of Music –I (Theory)	2+0+0	2	3 Hours	40		10	50
	DSES 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) VIth Semester
Discipline Specific Elective (DSE) Sitar

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSES 361A	General Theory of Music-II (Theory)	2+0+0	2	3 Hours	40		10	50
	DSES 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Sitar)

DSES 351A General Theory of Music -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the Ragas and Talas.

2 The students will be able to define the terminologies of Indian classical music.

3 The students will be able to explain the rich history of Indian music and contribution of renowned musician.

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of Raza Khani gats in the following Ragas:

(1) Yaman (2) Bhupali

(c) Ability to write Thekas with dugun in the following Talas:

(1) Teentaal (2) Kehrawa

SECTION-B

(a) Short notes on the followings:

Sangeet,Swar,Alankaar,Saptak,Raag,Thaat,Jaati, Vaadi Samvaadi Vivadi Anuvadi VarjitSwar , Taal, Gat,Tora,Sthai - Antra.

(b) Describe in detail about V.N Bhatkhande's Notation System.

(c) Relationship between Folk and Classical Music.

SECTION-C

(a) History of India Music from Vedic period to 12th Century.

(b) Contribution towards Music by the followings:

(1) V.N. Bhatkhande (2) V.D. Palustkar

(c) Detailed study of the following Instruments.

(1) Sitar (2) Guitar

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Sitar)

DSES 351B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of Playing.

2 The students will be able to demonstrate ragas and taalas.

3 The students will be able to tune their particular Instrument.

Syllabus and course of reading

(a) Two Drut Gats with Toras in each of the Ragas prescribed in the syllabus.

(b) Ability to play any Five basic alankars in Shudh Swaras.

(c) Ability to demonstrate Teental and Kehrawa by hand in Thah and Dugun Layakaries with reciting bols.

(d) Ability to play National Anthem on Sitar or Guitar.

(e) Tuning of Sitar.

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Sitar)

DSES 361A General Theory of Music -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe Ragas and Talas in detail.

2 The students will be able to illustrate the historical trends of Indian classical music.

3 The students will be to describe the various theoretical aspects of Indian classical music.

Syllabus and course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to write the notation of Any one Maseetkhani Gat in any Ragas prescribed in syllabus.

(c) Ability to write the notation of Raza Khani Gats in the following Ragas:

(1) Hameer (2) Vrindavani Sarang (3) Bhairav

(d) Ability to write the Thekas with dugun Layakaries in the following Talas:

(1) Ek Taal (2) Chautaal

SECTION-B

(a) Short notes on the following:

Naad,Shruti,Varan,Aavartan,Jhala,Soot,Meend,Ghaseet,Jamjama, Kan, Khatka, Murki,Krintan,Gamak, Laya.

(b) Classification of Indian Musical Instruments.

(c) Concept of Time Theory in Indian Classical Music.

SECTION-C

(a) Role of Media in the development of Indian Classical Music.

(b) Sitar Vadakon ke Gun-Dosh.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Ravi Shankar (2) Ustad Vilayat Khan

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Sitar)

DSES 361B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to demonstrate ragas.

2 The students will be able to play taalas on hand.

3 The Students will be able to describe the different parts of their instrument.

Syllabus and course of reading

(a) Three Drut Gats with Tora's and Jhala in each of the Ragas prescribed in the syllabus.

(b) Ability to play any one vilambit gat with toras in any of the prescribed ragas.

(c) Ability to play one dhun on Sitar/Guitar.

(d) Ability to play Thah and dugun on hand of the following Talas with reciting Bols.

(1) Ek Taal (2) Chautaal

(e) Tuning of Guitar.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6.Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr.Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr.Ashok Sharma
10.Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Honours (Music) Vth Semester
Discipline Specific Elective (DSE) Tabla

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSET 351A	General Theory of Tabla –I (Theory)	2+0+0	2	3 Hours	40		10	50
	DSET 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) VIth Semester
Discipline Specific Elective (DSE) Tabla

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSET 361A	General Theory of Tabla-II (Theory)	2+0+0	2	3 Hours	40		10	50
	DSET 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Tabla)

DSET 351A General Theory of Tabla -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the terminologies of Tabla and also exhibit the various taals of the syllabus.

2 The students will be able to describe the various terms of Tabla and pioneering work done by the legends of Hindustani music.

3 The students will be able to define the rich history of Tabla.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Origin and development of tabla.

(b) Definitions of following terms:

Taal, Laya, Matra, Theka, Sam, Taali, Khali, Avartan, Chinha, Bol, Vibhaag,

(c) Detailed Description of Teen taal, Kaharawa Taal, Ektaal and Jhap taal with thaah, dugun and chaugun.

SECTION-B

(a) Describe the different Parts of Tabla with Diagram

(b) Importance of Nagma (Lehra) in Tabla solo

(c) Biography and contribution of the following musicians

1. Pandit Anokhelal Mishra 2. Ustad Ahmad Jaan Thirakwa

SECTION-C

(a) History of prominent gharanas of Tabla.

(b) Relationship between Laya and Taal:

(c) Classification of instruments.

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Tabla)

DSET 351B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of Playing Tabla.
2 The students will be able to demonstrate taals by hand in different layakaries.
3 The students will be able to tune their particular instrument.

(a) Knowledge of basic Bols of Tabla.

(b) Ability to demonstrate Teen taal, Kahrawa, Ektaal and Jhap taal by hand in Thah, Dugun and

Chaugun Layakaries with reciting bols.

(c) Ability to play Teen taal or Kaharawa on Tabla with Ekgun and Dugun.

(d) Ability to play one kayda, palta and tihaai in any one of the taals prescribed in the syllabus.

(e) Tuning of Tabla.

Books Recommended

1. Taal Prasoon- Chhote Lal Mishra
2. Sangeet Visharad- Basant
3. Taal Parichay – Girish Chandra Shrivastava
4. Taal Prabandha - Chhote Lal Mishra
5. Tabla Puran – Vijay Shankar Mishra
6. Also Books Recommended by the teachers.

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Tabla)

DSET 361A General Theory of Tabla -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1 The students will be able to describe the different terminologies of the particular instrument.
2 The students will be able to illustrate about the different Avanadhya vadya.
3 The students will be to define the contribution of renowned musicians as well as the various theoretical terms related to the particular instrument.

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Origin and development of Pakhawaj.
(b) Definition of the following terms:
Uthan, Kaayda, Palta, Rela, Tihaai, Chakardaar, Toda, Tukda, Paran
(c) Detailed description of Rupak Taal, Dadra Taal, Dipchandi Taal and Chautaal taal

SECTION-B

(a) Define the following:
Mridangam, Dhol , Tasha , Naal , Nagada
(b) Taal ke Das Pran
(c) Importance of Tabla in modern Indian music.

SECTION-C

(a) Knowledge of Bhatkhande's Taal Notation system.
(b) Tabla vadakon ke Gun-Dosh.
(c) Biography and Contribution of the following musicians
(1) Pandit Kanthe Maharaj (2) Ustad Zakir Hussain

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Tabla)

DSET 361B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to exhibit the techniques of Playing Tabla.

2 The students will be able to demonstrate taals by hand in different layakaries.

3 The students will be able to tune their particular instrument.

(a) Knowledge of basic Terms of Tabla.

(b) Ability to demonstrate Rupak taal, Dadra Taal, Deepchandi taal and Jhaptaal by hand in Thah,

Dugun and Chaugun Layakaries with reciting bols.

(c) Ability to play Rupak or Dadra on Tabla with Ekgun and Dugun. .

(d) Ability to play one kayda, palta and tihaai in any one of the taals prescribed in the syllabus.

(e) Tuning of tabla.

Books Recommended

1. Taal Prasoon- Chhote Lal Mishra
2. Sangeet Visharad- Basant
3. Taal Parichay – Girish Chandra Shrivastava
4. Taal Prabandha - Chhote Lal Mishra
5. Tabla Puran – Vijay Shankar Mishra
6. Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC (IIHS)
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

B.A. Honours (Music) Vth Semester
Discipline Specific Elective (DSE) Vocal

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSEV 351A	General Theory of Music –I (Theory)	2+0+0	2	3 Hours	40		10	50
	DSEV 351B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) VIth Semester
Discipline Specific Elective (DSE) Vocal

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline specific Elective (DSE)	DSEV 361A	General Theory of Music-II (Theory)	2+0+0	2	3 Hours	40		10	50
	DSEV 361B	Stage performance & viva (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
Total			2+0+8	6		40	80	30	150

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Vocal)

DSEV 351A General Theory of Vocal -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1. The students will be able to describe the Ragas and Talas
2. The students will be able to define the terminologies of Indian classical music.
3. The students will be able to explain the rich history of Indian music and contribution of renowned musician.

Syllabus and Course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b)Ability to write the notation of Drut Khayal in the following Ragas:

(1) Yaman (2) Bhupali

(c) Ability to write Thekas with dugun in the following Talas:

(1) Kehrawa (2) Teentaal.

SECTION-B

(a) Short notes on the followings:

Sangeet, Swar, Alankaar, Saptak, Raag, Thaat, Jaati, Vaadi Samvaadi Vivadi Anuvadi VarjitSwar, Taal, Khayal, Taan, Sthai - Antra.

(b) Describe in detail about V.N Bhatkhande's Notation System.

(c) Relationship between Folk and Classical Music.

SECTION-C

(a) History of India Music from Vedic period to 12th Century.

(b) Contribution towards Music by the followings:

(1) V.N. Bhatkhande (2) V.D. Palustkar

(c) Detailed study of the following Instruments.

(1) Taanpura (2) Guitar

B.A. Honours (Music) SEMESTER: Vth
Discipline Specific Elective (Vocal)

DSEV 351B Stage Performance & Viva

Credit: 2
Time: 15-20 Minutes/student **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1. The students will be able to exhibit the techniques of Singing.

2. The students will be able to demonstrate ragas and taalas.

3. The students will be able to tune their particular Instrument.

Syllabus and Course of reading

(a) Two Drut Khayal's with Taan in each of the Ragas prescribed in the syllabus.

(b) Ability to sing any Five basic alankars in Shudh Swaras.

(c) Ability to demonstrate Teental and Kehrawa by hand in Thah and Dugun Layakaries with

reciting bols.

(d) Ability to sing National Anthem on Harmonium OR Guitar.

(e) Tuning of Tanpura.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr.Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet - Dr. Ashok Sharma
10. Also Books Recommended by the teachers.

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Vocal)

DSEV 361A General Theory of Vocal -I

Credit: 2
Time: 3Hrs. **Max. Marks: 50 (40 + 10 I.A.)**

Course Learning Outcome

1. The students will be able to describe Ragas and Talas in detail.
2. The students will be able to illustrate the historical trends of Indian classical music.
3. The students will be able to describe the various theoretical aspects of Indian classical music.

Syllabus and Course of reading

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt four questions, selecting at least one question from each section. All questions carry equal marks.

SECTION-A

(a) Historical study and detailed description of the Ragas prescribed in the syllabus.

(b) Ability to Write the notation of any one vilambit Khayal in any of the prescribed ragas.

(c) Ability to write the notation of all Drut Khayals in the following Ragas:

(1) Hameer (2) Vrindavani Sarang (3) Bhairav

(d) Ability to write the Thekas with dugun Layakaries in the following Talas:

(1) Ek Taal (2) Chautaal

SECTION-B

(a) Short notes on the following:

Naad, Shruti, Varan, Aavartan, Tarana, Kan, Khatka, Murki, Gamak, Aalap, Lakshan Geet, Laya.

(b) Classification of Indian Musical Instruments.

(c) Concept of Time Theory in Indian Classical Music.

SECTION-C

(a) Role of Media in the development of Indian Classical Music.

(b) Gayakon ke Gun-Dosh.

(c) Contribution towards Music by the following Musicians:

(1) Pt. Omkarnath Thakur (2) Ustad Abdul Kareem Khan

B.A. Honours (Music) SEMESTER: VIth
Discipline Specific Elective (Vocal)

DSEV 361B Stage Performance & Viva

Credit: 2
Time: 3Hrs. **Max. Marks: 100 (80 + 20 I.A.)**

Course Learning Outcome

1 The students will be able to demonstrate ragas.

2 The students will be able to play taalas on hand.

3 The Students will be able to describe the different parts of their instrument.

Syllabus and Course of reading

(a) Three Drut Khayals with allaps and Taans in each of the Ragas prescribed in the syllabus.

(b) Ability to sing any one vilambit Khayal with taans in any of the prescribed ragas.

(c) Ability to sing one Bhajan with Harmonium.

(d) Ability to play the Thah and dugun on hand of the following Talas with reciting Bols.

(1) Ek Taal (2) Chautaal

(e) Tuning of Guitar.

Books Recommended

1. Bhatkhande Sangeet Shastra- V. N. Bhatkhande
2. Sangeet Visharad- Basant
3. Kramik Pustak Mallika- Part II V. N. Bhatkhande
4. Sangeet Bodh – Sharad Chandra Pranjpayee
5. Hamare Sangeet Ratna- Laxmi Narayan Garg
6. Raag Parichay Part (1-2) - Harishchand Shrivastav
7. Shastriya Sangeet ka vikas – Dr.Amita Sharma
8. Aakashvani aur Sangeet - Prof. Shuchismita Sharma
9. Punjab ke Lokgeet – Dr. Ashok Sharma
10. Also Books Recommended by the teachers.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme and Syllabus

M.A. Music (Vocal and Sitar)
W.E.F Session 2020-21

According to CBCS & LOCF
(CHOICE BASED CREDIT SYSTEM & LEARNING OUTCOME BASED CURRICULUM FRAMEWORK)

KURUKSHETRA UNIVERSITY
KURUKSHETRA
2020-21

1. Programme outcomes (P.O.) of the faculty of Indic Studies

1. Scientific & Logical knowledge of ancient Indian wisdom.
2. Enhancing knowledge of Indian cultural traditions.
3. Knowledge of Vedic, medieval &modern Philosophies.
4. Inculcation of nationalism and other Moral values.
5. Enhancing mental relaxation and peace by adopting prayer, chanting, yoga and meditation.
6. Preservation of Indian arts and heritage by using modern technologies.
7. To Impart knowledge of different sanskaras & philosophy.
8. Imparting knowledge of folk traditions in different disciplines of the faculty.
9. Developing aesthetics, creativity & skills like singing, painting, dancing.
10. Improving the emotional intelligence through Geeta .

2. Programme specific outcomes (PSO) of M.A. Music

1. Constructs strong foundation and in-depth knowledge of Classical Music.
2. Introduced aesthetics and social significance of the Music.
3. Imparts knowledge of folk traditions.
4. Ability to be pursue for advance research in Music.
5. Ensures the employability after post graduations.

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DEPARTMENT OF MUSIC AND DANCE
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SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

M.A. (Vocal) Ist Semester

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 411	General and Applied Music -I (Theory)	4+0+0	4	3	80		20	100
Core-2	MMU 412	History of Indian music (Vedic period to 13th century) -I (Theory)	4+0+0	4	3	80		20	100
Core-3	MMUV 413	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUV 414	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUV 415	Lecture Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

M.A. (Vocal) IInd Semester

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 421	General and Applied Music – II (Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MMU 422	History of Indian music (Vedic period to 13th century)-II (Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MMUV423	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUV424	Viva –Voce & Comparative Study of Ragas (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUV425	Lecture Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Open Elective	OEM-1	General History and Basics of Indian Music (Inter-Disciplinary) –I*	2+0+0	2	3 Hours	40		10	50
Total						20	400	100	500

M.A. (Vocal) IIIrd Semester

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 531	Applied Music Theory and Musical Compositions -I (Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MMU 532	History of Indian music (13th Century to Modern period) -I (Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MMUV 533	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUV 534	Viva –Voce & Comparative Study of Ragas (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUV 535	Lecture-Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Open Elective	OEM-2	General History and Basics of Indian Music (Inter-Disciplinary)-II*	2+0+0	2	3 Hours	40		10	50
Total						20	400	100	500

M.A. (Vocal) IVth Semester

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 541	Applied Music Theory and Musical Compositions-II (Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MMU 542	History of Indian music (13th Century to Modern period)- II (Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MMUV 543	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUV 544	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUV 545	Lecture-Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

***Note** –1. **In M.A. Music course (Vocal & Sitar) Theory paper's are combined and have same syllabus as no changes in paper codes in scheme .**

2. Open Elective paper is an Inter -disciplinary paper . University/faculty will provide various option to students and students can choose any one given option / discipline by their choice within the Faculty .

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- I

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMU 411 General and Applied Music -I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Time**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 411**	**4**	**100**	**80**	**20**	**3 Hours**	**4**	**0**	**0**
Objects / Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about historical development of Raga of Indian classical music.**								
3.	**Enhances knowledge about various education systems and Gharanas in Indian classical music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit . Question no. one is objective type ,compulsory and covers the whole syllabus . All questions Carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas :
Devgiri Bilawal-Yamini Bilawal , Ahir Bhairav –Nat Bhairav ,
Shuddha Kalyan- Bhupali

(ii) General study of the following Ragas:
Alhaiya Bilawal, Bhairav, Yaman

(ii) Knowledge about the notation System of Bhatkhande as well as Vishnu Digamber paddhati. Notation of Vilambit and Drut Khayal/Gat of Ragas prescribed in the syllabus alongwith few Mukt Alaps Tanas and Bol Tanas.

iii) A study of the following Talas and ability to write and demonstrate on hands in Dugun, Tigun and chaugun Layakaries,---Teental, Jhaptal, Rupak and Keharva.

UNIT-II

(i) Genesis of Music, Indian and Western views about the development of Music.

(ii) Nature, concept and classifications of Jati described by Bharat, Matang and Sharangdev

(iii) Ten essentials of Ragas as described in the ancient texts and their application to Medieval and modern musical system .

UNIT-III

(i) Origin and development of ancient , medieval and Modern Education system in Indian classical music.
(ii) Origin and development of Gharana-system in Khayal/ Sitar-Vadan.
(iii) Desirability and possibility of maintaining Gharana in Modern times.

UNIT-IV

(i) The rationale of ancient classification of Indian Musical Instruments.
(ii) Historical knowledge of the following Instruments:
Ektantri, Chitra, Vanshi, Patah, Kansya Tala.
(iii) Detailed study of Voice- Culture with reference to ancient treaties and recent Scientific Research.

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M.A. Music (Vocal) Semester- I

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMU 412 History of Indian Music (Vedic Period to 13th Century)- I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 412**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Ancient treatise of India.**								
2.	**Enhances knowledge about the various aspects of music described in Mahakavyakal and medieval period.**								
3.	**Enhances knowledge about historical development of swaras.**								
4.	**Enhances knowledge about various aspects of music as described in treatise of medieval period .**								

Note: There shall be nine questions , Question no.1 is compulsory and contains 8 objective type Questions .The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I (i)Music in Samhitas, Brahmanas, Aranyakas.

UNIT-II (i) Music in Mahakavyakal: 1. Ramayana 2. Mahabharata And Shrimad Bhagwad Geeta
ii) Music in Smritis
iii)Music in Kautilya's Arthsastra.

UNIT-III (i)Historical Development of Swaras up to 13th Century.
(ii) A critical study of three grams: 1. Shadaj 2. Madhyam 3. Gandhar

UNIT-IV Study of the development of Music special reference to the following works:-

(i)Natya Shastra ,(ii)Brihhaddeshi, (iii)Sangeet-Ratnakar

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M.A. Music (Vocal) Semester- I

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUV 413 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUV 413**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhances ability to perform Tarana .**								

1. Intensive study of the following Ragas mentioned below under Various Angs. Atleast one Vilambit Khyal in any each of the following ragangs. General study of all the Ragas with one Drut Khyal in each raga with Alap and Taans/Todas.

   Alhaiya Bilawal, Bhairav, Yaman , 40

2. One Dhrupad / Dhamar or One Sadra in any one of the above mentioned ragas. 20

3. One Thumri or Dadra in raga Bhairavi 10

4. One Tarana in any raga of prescribed syllabus. 10

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M.A. Music (Vocal) Semester- I

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUV 414 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUV 414**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation .**								

1. A student is required has to Present one Intensive raga with Vilambit and drut Khyal with alap ,taan , bol taans etc ,asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience . (30)

   Devgiri Bilawal-Yamini Bilawal , Ahir Bhairav –Nat Bhairav ,
   Shuddha Kalyan- Bhupali

2. Comparative study and full description of all ragas. (30)

3. Capacity of demonstrate Talas by hand and on Tabla- Teental, Jhaptal, Rupak and Keharva. (10)

4. Ability to make notation of phrases ask by examiner.Tuning of particular Instruments : The Examiner may ask the candidate to tune some of the strings or his/her instrument . (10)

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M.A. Music (Vocal) Semester- I

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUV 415 LECTURE DEMONSTRATION (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUV 415**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performing , improvisation ,**								
2.	**Develops ability to compose bandish .**								
3.	**Develops ability to make notation.**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1. Student has to choose one thrust area in the supervision of concern teacher for the Lecture Demonstration and has to submit a written report about the selected topic before the Exam .The areas for lecture demonstration are given below

a) Classical Music b) Semi Classical Music c) Light Music d) Devotional Music (50)

a)Classical Music

Student can choose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study to prepare lecture demonstration, having atleast one Vilambit and Drut Khyal in each raga.

i) Bilawal Ang (ii) Bhairav Ang iii) Kalyan

b) Semi Classical Music

Student can choose any topic related to following semi classical forms and has to be submit a written before examination in the guidance of his class teacher . Student will prepare atleast three compositions in examination with his lecture demonstration.

i) Thumri ii) Dadra iii) Tappa iv) Kajari

c) Light Music

Student can choose any topic related to following light music forms and has to submit a written report before examination in the guidance of his/her class teacher . Student will prepare atleast three compositions for examination with his/her lecture demonstration.

i) Geet ii) Gazal

d) Devotional Music

Student can choose any topic related to following Devotional music forms and has to be submit a written report before examination in the guidance of his class teacher . Student will prepare atleast three compositions for examination with his lecture demonstration.

i) Bhajan ii) Sufi Music iii) Shabad and Gurumat Sangeet iv) Geeta Shloka.

e) Folk Music

Student can choose any topic related to Folk Music of any state of India and shall submit a written report before examination in the guidance of the concerned teacher and will prepare atleast three compositions for the lecture demonstration.

2. Compose at least one composition/bandish in any one raga of the prescribed syllabus. (20)
3. Abilty to make notation (10)
4. Capacity to demonstrate the following Talas on hand or on Tabla --Teental, Jhaptal, Rupak, Kaharwa. (10)

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M.A. Music (Vocal) Semester- II

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMU 421 General and Applied Music -II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 421**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about classification of various Ragas of Indian Music.**								
3.	**Enhances knowledge about interdisciplinary areas of Music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be ten questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I

i) A critical and comparative study of the following Ragas with special reference to Kafi , Sarang and Malhar ragang ,

Rageshree, Bageshree , Shuddha sarang- Shyam Kalyan, Megh –Madhumad Sanrang

ii) General study of the following Basic Ragas :
Bhimpalasi ,Vrindavani Sarang , Miyan Ki Malhar

(iii) Notation of Vilambit and Drut Khayal/ Gat of Ragas Prescribed in the Syllabus along with a few Mukt Alaps Tanas and Bol Tanas Toda with a capacity to write the notation in Bhatkhande as well as Visnudigamber paddhati.

iv). A study of the following Talas and ability to write them in Dugun, Tigun and Chaugun layakaries, . Ektaal, ,Chautaal ,Tivra , Dadra

Note:- Candidate is required to know the Talas of 1st semester also

UNIT-II Principals of classification of Raga :
Garma -Raga, Deshi-Raga, Dashvidhraag -Vargikaran of Sharangdev, Jatiraga-Vargikaran, Rag-Ragini Vargikaran, Mela-Raga Vargikarn, Thata-Raga Vargikaran, Raganaga-Rag Vargikaran.

UNIT-III

(i) Relationship between Music and Shrimad Bhagwad Geeta.
(ii) Relationship of Music and Aesthetics.
(iii) Relationship between Raga and Rasa. Definition of Rasa and its varities types (according to Bharta and Abhinav Gupta)
(iii) Role of Sound and Rythum in expressing a particular Bhava.

UNIT-IV

(i) The rationale of ancient classification of Indian Musical Instruments:-
Mattakokila, Vipanchi, Kinnari, Mridanga, Hudakka and Ghanta.

(ii) Elementary knowledge of Classical dances .
Kathak , Bharat Natyam , Kathakali, Manipuri ,Odisi ,

Note- Knowledge of Raga, Talas and theory portion of previous course is essential .

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M.A. Music (Vocal) Semester- II

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMU 422 History of Indian Music (Vedic Period to 13th Century) -2 (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 422**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Vedic treatise of India.**								
2.	**Enhances knowledge about the various concepts of music as described in Ancient and Medieval period.**								
3.	**Enhances knowledge about Shruti –Swaras relationship as described in historical Musical treatise .**								
4.	**Enhances knowledge about various aspects of music as described in treatise of medieval period .**								

Note: There shall be nine questions, two questions from each unit. The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I i) Music in Upanishads and Vedanga Literature with special reference to Shikshas.

ii) Music in Puranas with special reference to Harivansha and Markande.

UNIT-II
(i) Music in Paninis and Patanjalies Gramatic Treaties.
(ii) Music in Buddha and Jain Gramatic Treaties.
(ii) Music in the Dramas and Mahakavya of Kalidas.

UNIT-III **(i)**A critical study of Sapta Swara Murchhana and Dvadash Swara Murchhana.

(iii) Relationship of Shruti and Swara with special reference to the following works : Natya Shastra, Dattilam, Brihadeshi, Bharat Bhashya, Sangeet-Ratankara.

UNIT -IV Study of the development of Music special reference to the following works:-

Sangeet Parijat, Chaturdandi Prakashika, Sangeet Darpan

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M.A. Music (Vocal) Semester- II

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUV 423 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUV 423**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhances ability to perform Tarana .**								

1. Intensive study of the following Ragas mentioned below under Various Angs, Atleast One Vilambit Khyal in each of the following ragangs. General study of all the Ragas with one Drut Khyal in each raga with Alap and Taans/Todas. 30+10= 40

   Bhimpalasi ,Vrindavani Sarang , Miyan Ki Malhar

2. One Dhrupad or Dhamar or One Sadra in any one of the above mentiond ragas. 20

3. One Thumari or Dadra in raag kafi . 10

4. One Tarana in any raga of prescribed syllabus. 10

Note- Knowledge of Raga, Talas and theory portion of previous course is essential .

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- II

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUV 424 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUV 424**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation .**								

1. A student has to Present one Intensive raga with Vilambit and drut Khyal with alap ,taan , bol taans etc, asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience (30)

   Rageshree, Bageshree , Shuddha sarang- Shyam Kalyan, Megh –Madhumad Sanrang

2. Comparative study and full description of all ragas. (30)

3. Capacity of demonstrate Talas on hand and on Tabla- Ektaal, ,Chautaal ,Tivra , Dadra Talas of Ist Semester may be asked) (10)

4. Ability to make notation of phrases asked by the examiner and tuning the instruments (10)

Note- Knowledge of Raga, Talas of previous course is essential .

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- II

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUV 425 LECTURE DEMONSTRATION (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUV 425**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performing , improvisation ,**								
2.	**Develops ability to compose bandish .**								
3.	**Develops the ability to make notation.**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1. Student has to choose one thrust area in the supervision of concern teacher for the Lecture Demonstration and has to submit a written report about the selected topic before the Exam .The areas for lecture demonstration are given below

a) Classical Music b) Semi Classical Music c) Light Music d) Devotional Music (40)

a)Classical Music

Student can choose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study to prepare lecture demonstration, having atleast one Vilambit and Drut Khyal in each raga.

i) Malhar ragang ,ii) Kafi ragang, iii) Sarang ragang

b) Semi Classical Music

Student can choose any topic related to following semi classical forms and has to be submit a written before examination in the guidance of his class teacher . Student will prepare atleast three compositions in examination with his lecture demonstration.

ii) Thumri ii) Dadra iii) Tappa ,Kajari

c) Light Music

Student can choose any topic related to following light music forms and has to submit a written report before examination in the guidance of his/her class teacher . Student will prepare atleast three compositions for examination with his/her lecture demonstration.

i) Geet ii) Gazal

d) Devotional Music

Student can choose any topic related to following Devotional music forms and has to be submit a written report before examination in the guidance of his class teacher . Student will prepare atleast three compositions for examination with his lecture demonstration.

ii) Bhajan ii) Sufi Music iii) Shabad and Gurumat Sangeet iv) Shrimad Bhagwad Geeta

e) Folk Music

Student can choose any topic related to Folk Music of any state of India and shall submit a written report before examination in the guidance of the concerned teacher and will prepare atleast three compositions for the lecture demonstration.

2. Compose at least one composition/bandish in any one raga of the prescribed syllabus. (20)
3. Ability to make notation (10)

4. Capacity to demonstrate the following Talas on hand or on Tabla Ektaal, ,Chautaal ,Tivra , Dadra (Talas of Ist Semester may also be asked) (10)

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- III

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 531 Applied Music Theory and Musical Compositions-I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 531**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects/ Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about classification of various Ragas of Indian Music.**								
3.	**Enhances knowledge about interdisciplinary areas of Music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be Nine questions, two questions from each unit. The candidate shall be required to attempt five questions selecting one question from each unit . Question no One is Objective type ,compulsory and covers the whole syllabus . All questions carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Asawari , Kauns and Todi Ragangs :
Asawari – Komal Rishabh Asavari Chandrakauns, Madhukauns , Bilaskhani Todi -Gurjari todi, Madhuvanti – Multani

(ii) Detailed study of following Basic Ragas:
Jaunpuri , Malkauns ,Miyan Ki Todi

(iii) Ability to compose and make notation of a given piece of poetry in a raga prescribed in the syllabus. Ability to compose and make notation of a gat in the Tala (other than Teentala suggested by the examiner.

(iii) A study of the following Talas with different layakaries as Aad (1-1/2 beats) Dugun ,tigun, Chaugun and Chhaguna . Ada Chautaal, Deepchandi , Jat taal

UNIT-II

(i) Classification of Indian Musical Instrumental and knowledge of the techniques of the following classical musical instruments of north and south India prevalent in modern time.
Vichitra Veena, Sarod, Shahnai, Tabla, Mridangam. Harmonium

(ii) Types of Musical Compositions.
Prabandha, Dhrupada and Dhamar.

UNIT-III

(i) Essays of the following topics from the view point of inter-disciplinary studies:-

a. Basic principles of Rag Mishran.
b. Teaching techniques for virtual classroom .
c. Appreciation of Music.
d. Muslim contribution to Indian Music.
e. Principles of Musical compositions.
f. Role of Music in the promotion of Shrimad Bhagwad Geeta.

UNIT-IV

(i) Folk music of Haryana styles of singing, Dancing and Instruments.
(ii) The popular folk tunes of different states e.g.
Baul, Bhatiyali, Lawani and Bihu.

` ` Note- Knowledge of Ragas, Talas of previous course is essential .

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music (Vocal) Semester- III
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 532 History of Indian Music (13th Century to Modern period) – I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 532**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Vedic treatise of India.**								
2.	**Enhances knowledge about the various concepts of music as described in Ancient and Medieval period.**								
3.	**Enhances knowledge about Shruti –Swaras relationship as described in historical Musical treatise .**								
4.	**Enhances knowledge about various aspects of music as described in treatise of medieval period .**								

Note: There shall be Nine questions, two questions from each unit. The candidate shall be required to attempt five questions selecting one question from each unit . Question no One is Objective type ,compulsory and covers the whole syllabus . All questions carry equal marks.

UNIT-I

i) Study of the development of Music special reference to the following works:-

Swarmelakalanidhi, Sadragchandrodaya, Sangeet Saramrit, Rasakamudi, Raga-Vibodha,

ii) Study of production of sound through wire length on Veena as explained by various scholars like Sharangdev, Lochan, Ramamatya, Damodar-Mishra, Pt. Ahobala, Hridyanarayana Deva, Bhav Bhatt, Srinivasa.

UNIT-II

(i) Detailed study of the following :
Alapti, Sthaya, Giti, Vritti, Kaku, Kutup, Gamaka.

(iii) Meaning of word 'Swayambhu' as described by Ramamatya and Somnath.

UNIT-III Study of Western Music:

(i) Elementary knowledge of Staff Notation.
(ii) Harmony, Melody, Major Tone, Minor Tone

UNIT-IV Comparative study of Hindustani and Karnatak music with special reference to: (i) Swara (ii) Tala (iii) Mela (iv) Raga (v) Forms of Vocal and Instrumental Music.

Note- Knowledge of Raga, Talas and theory portion of previous course is essential .

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- III

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUV 533 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUV 533**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhances ability to perform Tarana .**								

1. Intensive study of the following Ragas mentioned below under Various Angs, Atleast One Vilambit Khyal in each of the following ragangs. General study of all the Ragas with one Drut Khyal in each raga with Alap and Taans/Todas. 30+10 = 40

   Jaunpuri , Malkauns ,Miyan Ki Todi

2. One Dhrupad or Dhamar or One Sadra in any one of the above mention ragas. 20

3. One Thumari or Dadra in raga Pilu . 10

4. One Tarana in any raga of prescribed syllabus. 10

Knowledge of Raga, Talas and theory portion of previous course is essential .

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KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- III

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUV 534 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUV 534**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation .**								

1. A student has to Present one Intensive raga with Vilambit and drut Khyal with alap ,taan , bol taans etc, asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience . (30)

Asawari – Komal Rishabh Asavari Chandrakauns, Madhukauns , Bilaskhani Todi -Gurjari todi, Madhuvanti – Multani

2. Comparative study and full description of all ragas. (30)

3. Capacity of demonstrate Talas on hand and on Tabla- Ada Chautaal, Deepchandi , Jat taal (10)
(Talas of Ist Semester may be asked)

4. Ability to make notaion and tuning of his/her instrument . (10)

Knowledge of Raga, Talas of previous course is essential .

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- III

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUV 535 LECTURE DEMONSTRATION(Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUV 535**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performing , improvisation ,**								
2.	**Ability to perform the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Develops ability to compose bandish .**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1.Student has to choose one thrust area in the supervision of concern teacher for the Lecture Demonstration and has to submit a written report about the selected topic before the Exam .The areas for lecture demonstration are given below

a) Classical Music b) Semi Classical Music c) Light Music d) Devotional Music (50)

a)Classical Music

Student can choose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study to prepare lecture demonstration, having atleast one Vilambit and Drut Khyal in each raga.

Asawari ,Kauns Ragang , Todi Ragang

b) Semi Classical Music

Student can choose any topic related to following semi classical forms and has to be submit a written before examination in the guidance of his class teacher . Student will prepare atleast three compositions in examination with his lecture demonstration.

iii) Thumri ii) Dadra iii) Tappa ,Kajari

c) Light Music

Student can choose any topic related to following light music forms and has to submit a written report before examination in the guidance of his/her class teacher . Student will prepare atleast three compositions for examination with his/her lecture demonstration.

i) Geet ii) Gazal

d) Devotional Music

Student can choose any topic related to following Devotional music forms and has to be submit a written report before examination in the guidance of his class teacher . Student will prepare atleast three compositions for examination with his lecture demonstration.

iii) Bhajan ii) Sufi Music iii) Shabad and Gurumat Sangeet

e) Folk Music

Student can choose any topic related to Folk Music of any state of India and shall submit a written report before examination in the guidance of the concerned teacher and will prepare atleast three compositions for the lecture demonstration.

4. Compose at least one composition/bandish in any one raga of the prescribed syllabus. (20)

3. Capacity to demonstrate the following Talas on hand or on Tabla -- Ada Chautaal, Deepchandi , Jat taal

(10)

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KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music (Vocal) Semester- IV

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 541 Applied Music Theory and Musical Compositions-II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 541**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about classification of various Ragas of Indian Music.**								
3.	**Enhances knowledge about interdisciplinary areas of Music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be Nine questions, two questions from each unit. The candidate shall be required to attempt five questions selecting one question from each unit . Question no One is Objective type ,compulsory and covers the whole syllabus . All questions carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Bihag , Purvi and Kanhara Raganga,
Bihag - Nat Bihag , Basant – Paraj , Shahana kanhara – Abhogi Kanhara

(ii) General study of the following basic Ragas:
Maru Bihag , Puriya Dhanasree ,Darbari

(iii) A study of the following Talas with different layakaries as Aad (1-1/2 beats) Dugun ,tigun, Chaugun and Chhaguna . Dhamar ,Sultaal ,Tilwara.
Note:- To be put for previous Talas and Name.

UNIT-II

(i) Classification of Indian Musical Instruments and knowledge of the techniques of the following classical Musical Instrumental of North & South India prevalent in Modern Time:-
Sarangi, Surbahar, Flute, Pakhawaj.

(ii) Types of musical compositions:
Khayal, Tarana, Chaturang, Trivata, Masitkhani Gat, Razakhani Gat.

UNIT-III

(i) Principles of Orchestration and its desirability and possibility in Hindustani Music.
(ii) Essays on the following topics from the view point of inter- disciplinary studies:
(a) Basic principles of Stage performance.
(b) Role of new Media in the Development of Indian Classical Music.
(c) Ravindra Sangeet.
(d) Haveli Sangeet.
(e) Natya Sangeet.
(f) Impact of Music and Shrimad Bhagwad Geeta on society.

UNIT-IV Study of Folk Music of Punjab:

(i) Folk music of Punjab : styles of Singing, Dancing and Instruments.
(ii) The popular folk tunes of different States e.g. Garba, Raas, Kajri, Chaiti and Jhoomar.

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KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music (Vocal) Semester- IV
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 542 History of Indian Music (13th Century to Modern period)-II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 542**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Medieval treatise of India.**								
2.	**Enhances knowledge about the Origin and significance of Time theory in modern period.**								
3.	**Enhances knowledge about various aspects of western music.**								
4.	**Spreads awareness about the contribution of different musician and composers of India.**								

Note: There shall be Nine questions, two questions from each unit. The candidate shall be required to attempt five questions selecting one question from each unit . Question no One is Objective type ,compulsory and covers the whole syllabus . All questions carry equal marks.

UNIT-I (a) **Study of the development of Music special reference to the following works:**

Hridaya-Kautak, Hridaya- Prakash, Raga Tatva- Vibodh, Raga-Tarangini, Anupavilas, Anup- Sangeet-Ratnakar.

b) Shruti Swara relation as described by modern thinkers like Foxstrangways:
S.N.Tagore, V.N.Bhatkhande, A. Denielou, Omkarnath Thakur, K.C.D.Brahaspati, L.M. Mishra, B.C.Deva etc.

UNIT-II **Time theory of Ragas:**

(i) Time theory of Ragas, its origin and development.
(ii) Observation of time in the Ragas.
(iii) Significance of time theory in Music.

UNIT-III **Study of Western Music:**

Musical scales- Pythagoras, Diatonic, Natural, Equal tempered.

UNIT-IV **Contribution of the following composers and Musicians:**

(i) Dr. Krishan Narayan Ratanjankar.
(ii) Raja Man Singh Tomar
(iii) Dr. K.C.D.Brihaspati
(iv) Dr. Lal Mani Mishra
(v) Kumar Gandharva

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M.A. Music (Vocal) Semester- IV

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUV 543 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUV 543**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhances ability to perform Tarana .**								

1. Intensive study of the following Ragas mentioned below under Various Angs. Atleast one Vilambit Khyal in any each of the following ragangs. General study of all the Ragas with one Drut Khyal in each raga with Alap and Taans . 40

   Maru Bihag , Puriya Dhanasree ,Darbari

2. One Dhrupad or Dhamar in any one of the above mention ragas. 10

3. One Thumari or Dadra in raga Pilu or Jhinjhoti . 10

4. One Sadra or bandish in Jhap Taal in any raga of prescribed syllabus 10

5. One Tarana in any raga of prescribed syllabus. 10

   Knowledge of Raga, Talas of previous course is essential .

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M.A. Music (Vocal) Semester- IV

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUV 544 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUV 544**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation .**								

1. A student is required has to Present one Intensive raga with Vilambit and drut Khyal with alap ,taan , bol taans etc ,asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience. (30)

   Bihag - Nat Bihag , Basant – Paraj , Shahana kanhara – Abhogi Kanhara

2. Comparative study and full description of all ragas. (20)

3. Capacity to demonstrate Talas on hand and on Tabla : Dhamar ,Sultaal ,Tilwara (Talas of Ist Semester may be asked) (10)

4. Ability to make notaion an Tuning of Instruments. .(10)

Knowledge of Raga, Talas and of previous course is essential .

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M.A. Music (Vocal) Semester- IV

SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUV 545 LECTURE DEMONSTRATION (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUV 545**	**4**	**100**	**80**	**20**	**30-35 min / Student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self-dependent in various areas i.e. performing , improvisation ,**								
2.	**Develops ability to compose bandish .**								
3.	**Develops Ability to make notation**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1.Student has to choose one thrust area in the supervision of concern teacher for the Lecture Demonstration and has to submit a written report about the selected topic before the Exam .The areas for lecture demonstration are given below

a) Classical Music b) Semi Classical Music c) Light Music d) Devotional Music (40)

a)Classical Music

Student can choose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study to prepare lecture demonstration, having atleast one Vilambit and Drut Khyal in each raga.

i) Bihag Ang ii) Kanada Ang :

b) Semi Classical Music

Student can choose any topic related to following semi classical forms and has to be submit a written before examination in the guidance of his class teacher . Student will prepare atleast three compositions in examination with his lecture demonstration.

iv) Thumri ii) Dadra iii) Tappa ,Kajari

c) Light Music

Student can choose any topic related to following light music forms and has to submit a written report before examination in the guidance of his/her class teacher . Student will prepare atleast three compositions for examination with his/her lecture demonstration.

i) Geet ii) Gazal

d) Devotional Music

Student can choose any topic related to following Devotional music forms and has to be submit a written report before examination in the guidance of his class teacher . Student will prepare atleast three compositions for examination with his lecture demonstration.

iv) Bhajan ii) Sufi Music iii) Shabad and Gurumat Sangeet

e) Folk Music

Student can choose any topic related to Folk Music of any state of India and shall submit a written report before examination in the guidance of the concerned teacher and will prepare atleast three compositions for the lecture demonstration.

2. Compose at least one composition/bandish in any one raga of the prescribed syllabus. (20)
3. Ability to make notaion (10)

3. Capacity to demonstrate the following Talas on hand or on Tabla -- . Dhamar ,Sultaal ,Tilwara. (10)

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SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.A. (Sitar) SEMESTER-I

Papers Category	**Code**	**Nomenclature**	**L+T+P**	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 411	General and Applied Music -I (Theory)	4+0+0	4	3	80		20	100
Core-2	MMU 412	History of Indian music (Vedic period to 13th century) –I (Theory)	4+0+0	4	3	80		20	100
Core-3	MMUS413	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUS 414	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUS 415	Lecture Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

M.A. (Sitar) IInd SEMESTER

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 421	General and Applied Music –II (Theory)	4+0+0	4	3	80		20	100
Core-2	MMU 422	History of Indian music (Vedic period to 13th century) -II (Theory)	4+0+0	4	3	80		20	100
Core-3	MMUS423	Stage performance (Practical)	0+0+8	4	30-35 min/ Student		80	20	100
Core-4	MMUS424	Viva –Voce & Comparative Study of Ragas (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUS425	Lecture Demonstration (Practical)	0+0+8	4	30-35 min/ Student		80	20	100
Open Elective	OEM-1	General History and Basics of Indian Music (Inter-Disciplinary) –I*	2+0+0	2	3	40		10	50
Total						20	400	100	500

M.A. (Sitar) IIIrd SEMESTER

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 531	Applied Music Theory and Musical Compositions -I (Theory)	4+0+0	4	3	80		20	100
Core-2	MMU 532	History of Indian music (13th Century to Modern period) -I (Theory)	4+0+0	4	3	80		20	100
Core-3	MMUS 533	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUS 534	Viva –Voce & Comparative Study of Ragas (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUS 535	Lecture-Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Open Elective	OEM-2	General History and Basics of Indian Music (Inter-Disciplinary)-II*	2+0+0	2	3	40		10	50
Total						20	400	100	500

M.A. (Sitar) IVth SEMESTER

Papers Category	Code	Nomenclature	L+T+P	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MMU 541	Applied Music Theory and Musical Compositions-II (Theory)	4+0+0	4	3	80		20	100
Core-2	MMU 542	History of Indian music (13th Century to Modern period)-II (Theory)	4+0+0	4	3	80		20	100
Core-3	MMUS 543	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MMUS 544	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MMUS 545	Lecture-Demonstration (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

***Note** –1. **In M.A. Music course (Vocal & Sitar) Theory paper's are combined and have same syllabus as no changes in paper codes in scheme .**

2. Open Elective paper is an Inter -disciplinary paper . University/faculty will provide various option to students and students can choose any one given option / discipline by their choice within the Faculty .

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SYLLABUS AND COURSES OF READING
M.A. Music Instrumental (Sitar) SEMESTER-I
(W.E.F. 2020-21)

MMU 411 General and Applied Music Theory-I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 411**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about historical development of Raga of Indian classical music.**								
3.	**Enhances knowledge about various education systems and Gharanas in Indian classical music.**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas :
Devgiri Bilawal, Yamani Bilawal, Ahir Bhairav, Nat Bhairav, Shyam Kalyan, Shuddha Sarang,

(ii) General study of the following Ragas:
Alhaya-Bilawal, Bhairav, Madhumad Sarang

(ii) Knowledge about the notation System of Bhatkhande as well as Vishnu Digamber paddhati. Notation of Vilambit and Drut Khayal/Gat of Ragas prescribed in the syllabus alongwith few Mukt Alaps Tanas and Bol Tanas.

iii) A study of the following Talas and ability to write and demonstrate on hands in Dugun, Tigun and chaugun Layakaries,Teental, Jhaptal, Rupak and Keharva.

UNIT-II

(i) Genesis of Music, Indian and Western views about the development of Music.
(ii) Nature, concept and classifications of Jati described by Bharat, Matang and Sharangdev
(iii) ten essentials of Ragas as described in the ancient texts and their application to Medieval and modern musical system.

UNIT-III

(i) Origin and Development of Gharana-system in Khayal/ Sitar-Vadan.
(ii) Desirability and possibility of maintaining Gharana in Modern times.

UNIT-IV

(i) The rationale of ancient classification of Indian Musical Instruments.
(ii) Historical knowledge of the following Instruments:
Ektantri, Chitra, Vanshi, Patah, Kansya Tala.
(iii) Detailed study of Voice- Culture with reference to ancient treaties and recent Scientific Research.

DEPARTMENT OF MUSIC AND DANCE
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M.A. Music Instrumental (Sitar) SEMESTER-I
(W.E.F. 2020-21)

MMU 412 History of Indian Music (Vedic Period to 13th Century) -I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 412**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Ancient treatise of India.**								
2.	**Enhances knowledge about the various aspects of music described in Mahakavyakal and medieval period.**								
3.	**Enhances knowledge about historical development of swaras.**								
4.	**Enhances knowledge about various aspects of music as described in treatise of medieval period .**								

Note: There shall be nine questions , Question no.1 is compulsory and contains 8 objective type Questions .The candidate shall be required to attempt five questions in all, selecting one question from each unit. All questions carry equal marks.

UNIT-I (i)Music in Samhitas, Brahmanas, Aranyakas.

UNIT-II (i) Music in Mahakavyakal: 1. Ramayana 2. Mahabharata
ii) Music in Smritis
iii)Music in Kautilya's Arthsastra.

UNIT-III (i)Historical Development of Swaras up to 13th Century.
(ii) A critical study of three grams: 1. Shadaj 2. Madhyam 3. Gandhar

UNIT-IV (i)Study of the development of Music special reference to the following works:-

(ii)Natya Shastra ,Brihhaddeshi, Sangeet-Ratnakar

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M.A. Music Instrumental (Sitar) SEMESTER-I
SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUS 413 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUS 413**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level.**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical instrumental forms**								
3.	**Develops ability to perform semi classical instrumental forms .**								
4.	**Enhances ability to perform jhala .**								

1. Intensive study of the following Ragas mentioned below under Various Angs. Atleast one Vilambit Gat in any each of the following ragangs. General study of all the Ragas with one Drut Gat in each raga with Jor –Alap Jor –Jhala Alap and Taans/Todas and Jhala.

   Alhaiya Bilawal, Bhairav, Yaman, Kirwani 40
   .

2. One Gat In Other than Teen Taal in any one of the above mentioned ragas. 10

3. One Dhun in raga Bhairavi 10

4. One Gat in Jhap Taal in any raga of prescribed syllabus. 10

5. National Anthem and Gita Shlokas (Sitar/Vocal) 10

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SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUS 414 Viva-Voce & Comparative Study of Ragas(Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUS 414**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation.**								

1. A student is required has to Present one Intensive raga with Alap,Jod Jhala, Maseetkhani and Razakhani Gat asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience.

   (20)

   Devgiri Bilawal-Yamini Bilawal, Ahir Bhairav –Nat Bhairav,
   Shuddha Kalyan- Bhupali

2. Comparative study and full description of all ragas. (30)

3. Capacity of demonstrate Talas by hand and on Tabla-Teental, Jhaptal, Rupak, Chautal, Dadra, Dhamar.(Talas of Ist Semester may be asked) (10)

4. Tuning and repairing of particular Instruments : The Examiner may ask the candidate to tune and repair some of the strings or his/her instrument and may asses the tuning capacity of the candidate during his/her total performance.

   (10)

5. Ability to make notaion of phrases ask by examiner. (10)

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SYLLABUS AND COURSES OF READING
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MMUS 415 Lecture Demonstration (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUS 415**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performing , improvisation ,**								
2.	**Ability to perform the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Develops ability to compose bandish .**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1.Student has to choose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study to prepare lecture demonstration, having atleast one Vilambit/Maseetkhani and Drut /RazaKhani Gat in each raga.
(30)

(i) Bilawal Ang

(ii) Bhairav Ang

(iv) Kalyan Ang
.

2. An Intensive study of only three from the following basic ragas with Alap, Vilambit and Durt composition and detailed description of your instrument with deep knowledge of its every part. (20)

3. Compose at least one composition/Gat in any one raga of the prescribed Syllabus . (10)

4. Capacity to demonstrate the following Talas by hand or on Tabla -Teental, Jhaptal, Rupak, Chautal, Dadra, Dhamar. (10)

5 Vande Mataram and Gita Shlokas (Sitar / Vocal) (10)

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M.A. Music Instrumental (Sitar) SEMESTER-II
SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMU 421 General and Applied Music Theory-II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 421**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about classification of various Ragas of Indian Music.**								
3.	**Enhances knowledge about interdisciplinary areas of Music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

UNIT-I

i) A critical and comparative study of the following Ragas with special reference to Kafi, Sarang and Malhar ragang,

Rageshree, Bageshree , Shuddha sarang- Shyam Kalyan, Megh –Madhumad Sanrang

ii) General study of the following Basic Ragas :
Bhimpalasi ,Vrindavani Sarang , Miyan Ki Malhar

(iii) Notation of vilambit and Drut Khayal/ Gat of Ragas Prescribed in the Syllabus along with a few Mukt Alaps Tanas and Bol Tanas Toda with a capacity to write the notation in Bhatkhande as well as Visnudigamber paddhati.

iv) A study of the following Talas and ability to write them in Dugun, Tigun and Chaugun layakaries, Tilwara, Sooltala, Tivra and Dadra.
Note:- Candidate is required to know the Talas of 1st semester also i.e. Ektaal, Deepchandi,Chautaal & Tivra

UNIT-II Principals of classification of Raga :
Garma -Raga, Deshi-Raga, Dashvidhraag -Vargikaran of Sharangdev, Jatiraga-Vargikaran, Rag-Ragini Vargikaran, Mela-Raga Vargikarn, Thata-Raga Vargikaran, Raganaga-Rag Vargikaran.

UNIT-III

(i) Relationship between music and Shrimad Bhagwad Gita
(ii) Relationship of Music and Aesthetics.
(iii) Relationship between Raga and Rasa. Definition of Rasa and its Verities (according to Bharta and Abhinav Gupta)
(iii) Role of Sound and Rythum in expressing a particular Bhava.

UNIT-IV

(i) The rationale of ancient classification of Indian Musical Instruments:- Mattakokila, Vipanchi, Kinnari, Mridanga, Hudakka and Ghanta.

(ii) Elementary knowledge of Classical dances .
Kathak , Bharat Natyam , Kathakali, Manipuri ,Odisi ,

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MMU 422 History of Indian Music (Vedic Period to 13th Century) -II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 422**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Vedic treatise of India.**								
2.	**Enhances knowledge about the various concepts of music as described in Ancient and Medieval period.**								
3.	**Enhances knowledge about Shruti –Swaras relationship as described in historical Musical treatise .**								
4.	**Enhances knowledge about various aspects of music as described in treatise of medieval period .**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

UNIT-I i) Music in Upanishads and Vedanga Literature with special reference to Shikshas.

ii) Music in Puranas with special reference to Harivansha and Markande

UNIT-II (i) Music in Paninis and Patanjalies Gramatic Treaties.
(ii) Music in Buddha and Jain Gramatic Treaties.
(ii) Music in the Dramas and Mahakavya of Kalidas.

UNIT-III **(i)**A critical study of Sapta swara Murchhana and Dvadash Swara Murchhana.

(iii) Relationship of Shruti and Swara with special reference to the following works : Natya Shastra, Dattilam, Brihadeshi, Bharat Bhashya, Sangeet-Ratankara.

UNIT -IV Study of the development of Music special reference to the following works:-

Sangeet parijat, Chaturdandi Prakashika, Sangeet Darpan

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M.A. Music Instrumental (Sitar) SEMESTER-II

SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUS 423 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUS 423**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances Creativity and Systematic improvisation ability in students .**								
2.	**Develops confidence to perform as a musically mature and sensible artist .**								
3.	**Develops ability to play various classical instrumental forms.**								
4.	**Develops aptitude of patriotism and spirituality.**								

1. Intensive study of the following Ragas mentioned below under Various Angs, Atleast One Vilambit Gat in each of the following ragas. General study of all the Ragas with one Drut Gat in each raga with Alap ,Jor- Alap , Jhala and Taans/Todas. 40

   Bhimpalasi, Vrindavani Sarang, Miyan Ki Malhar

2. One Gat In Other than Teentaal in any one of the above mention ragas. 10

3. One Dhun in raag Pilu. 10

4. One Gat in Jhap Taal in any raga of prescribed syllabus. 10

5. Sare Jahan se Achha and Gita Shlokas (Sitar/Vocal) 10

Note- Knowledge of Raga, Talas and theory portion of previous course is essential.

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SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUS 424 Viva-Voce & Comparative Study of Ragas(Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUS 424**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation .**								

1. A student has to Present one Intensive raga with Alap,Jod Jhala, Maseetkhani and Razakhani Gat asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience. . (20)

   Rageshree- Bageshree , Shuddha sarang- Shyam Kalyan, Megh –Madhumad Sanrang

2. Comparative study and full description of all ragas. (30)

3. Capacity of demonstrate Talas by hand and on Tabla-Ektaal,chautaal deepchandi,Tivra .(Talas of Ist Semester may be asked) (10)

4. The Examiner may ask the candidate to tune some of the strings or his/her instrument or may asses the tuning capacity of the candidate during his/her total performance. (10)

5. Ability to make notaion of phrases ask by examiner. (10)

Note- Knowledge of Raga, Talas and theory portion of previous course is essential.

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SYLLABUS AND COURSES OF READING
(W.E.F. 2020-21)

MMUS 425 Lecture Demonstration (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUS 425**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performing , improvisation ,**								
2.	**Ability to perform the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Develops ability to compose bandish .**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1.Student has to chose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study having atleast one Vilambit and drut Gat in each raga. (30)

(i) Puriya
A. Puria Kalyan
B. Shyama Kalyan

(iv) Kafi
A. Bageshwari
B. Rageshwari

2. An intensive study of only three from the following basic ragas with Alap, Vilambit and Durt composition and general study of any priscribed Ragas with alap and Durt composition:- Deshkar, Yaman, Kafi (20)

3. Compose at least one composition/bandish in any one raga mention above. (10)

4. Capacity of demonstrate Talas by hand and on Tabla- Ektaal,chautaal deepchandi,Tivra (Talas of Ist Semester may be asked) (10)

5 Any Patriotic song (Sitar/Vocal) (10)

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M.A. Music Instrumental (Sitar) SEMESTER-III
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 531 Applied Music Theory and Musical Compositions- I (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 531**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about classification of various Ragas of Indian Music.**								
3.	**Enhances knowledge about interdisciplinary areas of Music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Asawari , Kauns and Todi Ragangs :
Asawari – Komal Rishabh Asavari Chandrakauns, Madhukauns , Bilaskhani Todi -Gurjari todi, Madhuvanti – Multani

(ii) General Detailed study of following Basic Ragas:
Jaunpuri, Malkauns ,Miyan Ki Todi

(iii) Ability to compose and make notation of a given piece of poetry in a raga prescribed in the syllabus. Ability to compose and make notation of a gat in the Tala (other than Teentala suggested by the examiner.

(iv) A study of the following Talas with different layakaries as Aad (1-1/2 beats) Dugun ,tigun, Chaugun and Chhaguna . Teen taal, Ektaal , Ada Chautal, Rupak , Tivra.

UNIT-II

(i) Classification of Indian Musical Instrumental and knowledge of the techniques of the following classical musical instruments of north and south India prevalent in modern time.
Vichitra Veena, Sarod, Shahnai, Tabla, Mridangam.

(ii) Types of Musical Compositions.
Prabandha, Dhrupada and Dhamar.

UNIT-III

(i) Essays of the following topics from the view point of inter-disciplinary studies:-

a. Basic principles of Rag Mishran.
b. Pictorial Aspects of Ragas.
c. Appreciation of Music.
d. Muslim contribution to Indian Music.
e. Principles of Musical compositions.
f. Role of Music in the promotion of Shrimad Bhagwad Gita.

UNIT-IV

(i) Folk music of Haryana styles of singing, Dancing and Instruments.

(ii) The popular folk tunes of different states e.g.
Baul, Bhatiyali, Lawani and Bihu.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music Instrumental (Sitar) SEMESTER-III
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 532 History of Indian Music (to 13th Century to Modern Period) -2 (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 532**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Vedic treatise of India.**								
2.	**Enhances knowledge about the various concepts of music as described in Ancient and Medieval period.**								
3.	**Enhances knowledge about Shruti –Swaras relationship as described in historical Musical treatise .**								
4.	**Enhances knowledge about various aspects of music as described in treatise of medieval period .**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

UNIT-I

i) Study of the development of Music special reference to the following works:-

Swarmelakalanidhi, Sadragchandrodaya, Sangeet Saramrit, Rasakamudi, Raga-Vibodha,

ii) Study of production of sound through wire length on Veena as explained by various scholars like Sharangdev, Lochan, Ramamatya, Damodar-Mishra, Pt. Ahobala, Hridyanarayana Deva, Bhav Bhatt, Srinivasa.

UNIT-II

(i) Detailed study of the following :
Alapti, Sthaya, Giti, Vritti, Kaku, Kutup, Gamaka.

(ii) Meaning of word 'Swayambhu' as described by Ramamatya and Somnath.

UNIT-III Study of Western Music:-

(i) Elementary knowledge of Staff Notation.

(ii) Harmony, Melody, Major Tone, Minor Tone

UNIT-IV Comparative study of Hindustani and Karnatak music with special reference to:

(i) Swara (ii) Tala (iii) Mela (iv) Raga (v) Forms of Vocal and Instrumental Music

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music Instrumental (Sitar) SEMESTER-III
(W.E.F. 2021-22)

MMUS 533 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUS 533**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical instrumental forms**								
3.	**Develops ability to perform semi classical instrumental forms.**								
4.	**Enhances ability to perform Jhala.**								

1. Intensive study of the following Ragas mentioned below under Various Angs, Atleast One Vilambit /Maseetkhani Gat in each of the following ragas. General study of all the Ragas with one Drut Gat in each raga with Alap Jor, Jhala and Taans/Todas. 30+10=40

   Malkauns ,Miyan Ki Todi, Charukeshi

2. One Gat In Other than Teentaal in any one of the above mention ragas. 10

3. One Dhun in any raga. 10

4. One Gat in Jhap Taal in any raga of prescribed syllabus. 10

5 Aye mere vatan ke logo and Gita Shlokas (Sitar/ Vocal) 10

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.A. Music Instrumental (Sitar) SEMESTER-III

(W.E.F. 2021-22)

MMUS 534 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUS 534**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation.**								

1. A student has to Present one Intensive raga asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce as his/her choice Raga and perform it for not less than 30 minutes before an invited audience. Alap, Jod Jhala, Maseetkhani and Razakhani Gat are required to be presented. (20)

   Miyan ki Malhar - Bahar, Chandrakauns- Madhukauns, Bilaskhani Todi -Gurjari todi, Madhuvanti – Multani

2. Comparative study and full description of all ragas. (30)

3. Capacity of demonstrate Talas by hand and on Tabla-Ektaal,Chautaal, Deepchandi,Tivra .(Talas of Ist Semester may be asked) (10)

4. The Examiner may ask the candidate to tune some of the strings or his/her instrument or may asses the tuning capacity of the candidate during his/her total performance. (10)

5. Ability to make notaion of phrases ask by the examiner. (10)

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music Instrumental (Sitar) SEMESTER-III
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUS 535 Lecture Demonstration (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUS 535**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performing , improvisation ,**								
2.	**Ability to perform the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Develops ability to compose bandish .**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1. Student has to chose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study having atleast one Vilambit and drut Gat in each raga. (30)

(i) Kauns Ragang — Chandrakauns, Madhukauns,

(ii) Todi Ragang — Bilaskhani Todi, Multani,

(iii) Malhar ragang — Sur Malhar, Miyan ki Malhar.

2. An intensive study of only three from the following basic ragas with Alap, Vilambit and Durt composition and general study of any four Ragas with alap and Durt composition:-
Puriya, Marwa, Kafi, (20)

3. Compose at least one composition/bandish in any one raga mention above. (20)

4. Capacity of demonstrate Talas by hand and on Tabla- Ektaal,chautaal deepchandi,Tivra (Talas of Ist Semester may be asked) (10)

5 Any Patriotic Song (Sitar/Vocal) (10)

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music Instrumental (Sitar) SEMESTER-IV
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 541 Applied Music Theory and Musical Compositions -II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MMU 541**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhances knowledge about prescribed ragas and talas of Indian classical music and develops ability to write notation.**								
2.	**Enhances knowledge about classification of various Ragas of Indian Music.**								
3.	**Enhances knowledge about interdisciplinary areas of Music .**								
4.	**Enhances knowledge about classification of various musical Instruments of Indian Music.**								

Note: There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

UNIT-I

(i) A critical and comparative study of the following Ragas with special reference to Bihag , Purvi and Kanhara Raganga,
Bihag - Nat Bihag, Basant – Paraj, Shahana kanhara – Abhogi Kanhara

(ii) General study of the following basic Ragas:
Maru Bihag, Puriya Dhanasree, Darbari

(iii) A study of the following Talas with different layakaries as Aad (1-1/2 beats) Dugun ,tigun, Chaugun and Chhaguna . Tivra, Ektal Tilwada.
Note:- To be put for previous Talas and Name.

UNIT-II

(i) Classification of Indian Musical Instruments and knowledge of the techniques of the following classical Musical Instrumental of North & South India prevalent in Modern Time:-
Sarangi, Surbahar, Flute, Pakhawaj.

(ii) Types of musical compositions:
Khayal, Tarana, Chaturang, Trivata, Masitkhani Gat, Razakhani Gat.

UNIT-III

(i) Principles of Orchestration and its desirability and possibility in Hindustani Music.

(ii) Essays on the following topics from the view point of inter- disciplinary studies:

(a) Basic principles of Stage performance.
(b) Role of Media in the Development of Indian Classical Music.
(c) Raviandra Sangeet.
(d) Haveli Sangeet.
(e) Natya Sangeet.
(f) Impact of Music and Shrimad Bhagwad Gita on the society.

UNIT-IV Study of Folk Music in Punjab:

(i) Folk music of Punjab styles of Singing, Dancing and Instruments.

(ii) The popular folk tunes of different States e.g. Garba, Raas, Kajri, Chaiti and Jhoomar.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music Instrumental (Sitar)
SEMESTER-IV
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMU 542 History of Indian Music (13th Century to Modern period)-II (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MMU 542**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Students' Knowledge about the various terms used in Vedic Literature and Important aspects of Indian Classical Music written in historical musical treatise .**								
	Course Outcomes								
1.	**Spreads awareness about different aspects of music as described in Medieval treatise of India.**								
2.	**Enhances knowledge about the Origin and significance ofTime theory in modern period.**								
3.	**Enhances knowledge about various aspects of western music.**								
4.	**Spreads awareness about the contribution of different musician and composers of India.**								

Note: There shall be Nine questions, two questions from each unit. The candidate shall be required to attempt five questions selecting one question from each unit . Question no One is Objective type,compulsory and covers the whole syllabus . All questions carry equal marks.

UNIT-I (a) **Study of the development of Music special reference to the following works:**
Hridaya-Kautak, Hridaya- Prakash, Raga Tatva- Vibodh, Raga-Tarangini, Anupavilas, Anup- Sangeet-Ratnakar.

b) Shruti Swara relation as described by modern thinkers like Foxstrangways:
S.N.Tagore, V.N.Bhatkhande, A. Denielou, Omkarnath Thakur, K.C.D.Brahaspati, L.M. Mishra, B.C.Deva etc.

UNIT-II **Time theory of Ragas:**
(i) Time theory of Ragas, its origin and development.
(ii) Observation of time in the Ragas.
(iii) Significance of time theory in Music.

UNIT-III **Study of Western Music:**
Musical scales- Pythagoras, Diatonic, Natural, Equal tempored.

UNIT-IV **Contribution of the following composers and Musicians:**
(i) Dr. Krishan Narayan Ratanjankar.
(ii) Raja Man Singh Tomar
(iii) Dr. K.C.D.Brihaspati
(iv) Dr. Lal Mani Mishra
(v) Kumar Gandharva
(vi) Wajid Ali Shah

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.A. Music Instrumental (Sitar) SEMESTER-IV
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUS 543 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MMUS 543**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances knowledge of prescribed Ragangs and imparts Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical instrumental forms**								
3.	**Develops ability to perform semi classical instrumantal forms .**								
4.	**Enhances ability to perform Jhala.**								

1. Intensive study of the following Ragas mentioned below under Various Angs. Atleast one Vilambit Gat in any each of the following ragas. General study of all the Ragas with one Drut Gat in each raga with Alap Jor-Alap, Jhala and Taans/Todas.

   Maru Bihag , Puriya Dhanasree ,Darbari 40

2. One Gat In Other than Teentaal in any one of the above mention ragas. 10

3. One Dhun/Folk Dhun in any raga. 10

4. One Gat in Jhap Taal in any raga of prescribed syllabus. 10

5. Any patriotic song and Gita Shlokas (Sitar/Vocal) 10

Knowledge of Raga, Talas and theory portion of previous course is essential.

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M.A. Music Instrumental (Sitar) SEMESTER-IV
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUS 544 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MMUS 544**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform, comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to make notation .**								

1. A student is required has to Present one Intensive raga with Alap,Jod Jhala, Maseetkhani and Razakhani asked by Examiner from prescribed syllabus in Paper-IV Viva -Voce ,as his/her choice Raga and perform it for not less than 30 minutes before an invited audience. (30)

   Abhogi Kanada, Shahana Kanada, Maru Bihag, Nat Bihag

   (ii)Theoretical studies of the following basic Ragas:
   Darbari, Bhimpalasi

2. Comparative study and full description of all ragas. (20)

3. Capacity of demonstrate Talas by hand and on Tabla : Teental, Jhaptal, Rupak, Chautal, Dadra, Dhamar. (Talas of Ist Semester may be asked) (10)

4. Tuning of Instruments. The Examiner may ask the candidate to tune some of the strings or his/her instrument or may asses the tuning capacity of the candidate during his/her total performance.(10)

5. Ability to make notaion of phrases asked by examiner. (10)

DEPARTMENT OF MUSIC AND DANCE
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M.A. Music Instrumental (Sitar) SEMESTER-IV
SYLLABUS AND COURSES OF READING
(W.E.F. 2021-22)

MMUS 545 Lecture Demonstration (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MMUS 545**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self-dependent in various areas i.e. performing , improvisation ,**								
2.	**Ability to perform the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Develops ability to compose bandish .**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1. Student has to chose any one ang and have to prepare the ragas of that Ang with historical devlopement and detailed comparative study having atleast one Vilambit/Maseetkhani and drut/Razakhani Gat in each raga. (30)

A. Bihag Ang : (i) Maru Bihag (ii) Nat Bihag

B. Kanada Ang : (i) Darbari Kanada (ii) Aabhogi Kanada

2. An intensive study of only two from the following basic ragas with Alap, Vilambit and Durt composition and general study of any four Ragas with alap and Durt composition:-
Bhmpalasi , Charukeshi, (20)

3. Compose at least one composition/Gat in any one raga mention above. (10)

4. Capacity of demonstrate Talas by hand and on Tabla :
Teental, Jhaptal, Rupak, Chautal, Dadra, Dhamar (Talas of Ist Semester may be asked) (10)

5 Any Patriotic Song and Gita Shlokas (Sitar/Vocal) (10)

Department of Music and Dance

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Open Elective (Music) Semester - II

(W.E.F. 2020-21)

OEM-I General History and Basics of Indian Music –I (Theory)									
Open Elective	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**OEM-I**	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
	Objects/Purpose								
1.	**To enhance the Students' Creativity and ability in Field of Music .**								
2.	**To build Students' Confidence and Artistic aptitude to perform as an Artist .**								
	Course Outcomes								
1.	**Enhances Creativity and Basic improvisation ability in students .**								
2.	**Develops confidence to perform as a musically mature and sensible artist .**								
3.	**Ability to perform various classical and Light music forms .**								
4.	**To Develops interest towards classical music .**								

General History and Basics of Indian Music

Unit –I

I. Music and Sound

I.I Music and its types – Classical , Semi Classical , Folk Music and Light music.

I.2 Sound ,Vibration , Frequeancy.

I.3 Naad and its types Aahat Naad ,Anhat Naad.

Unit –II

2. Musical terms

2.I Shruti ,swar ,Shuddha Swar, Vikrit Swar

2.2 Laya and its types Vilambit laya Madhya laya drut laya.

Unit-III

3. Introduction to Taal ,

3.1 Theka , Avartan , Taali , Khali, Sam ,Vibhag.

3.2 Teen Taal , kaharwa , Dadra

3.3 Ability to write notation and demonstration on hands with Thah and Dugun .

Unit-IV

4. Practical and Exercise

4.1 Five besic Alankar in shuddha swaras.

4.2 Knowledge of Ten Thats of Pt. Bhatkhande and introduction of their Aasraye Ragas .

4.3 Five film songs based on five Aashraye ragas.

4.4 National Antham and National song with instruments.

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Open Elective (Music) Semester- III

(W.E.F. 2021-22)

OEM-II General History and Basics of Indian Music –II (Theory)									
Open Elective	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**OEM-II**	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
	Objects/Purpose								
1.	**To enhance the Students' Creativity and ability in Field of Music .**								
2.	**To build Students' Confidence and Artistic aptitude to perform as an Artist .**								
	Course Outcomes								
1.	**Enhances Creativity and Basic improvisation ability in students .**								
2.	**Develops confidence to perform as a musically mature and sensible artist .**								
3.	**Ability to perform various classical and Light music forms .**								
4.	**To Develops interest towards classical music .**								

General History and Basics of Indian Music

Unit –I

I. History of music

I.I Aspects of music ,practical and theory

I.2 Saptak and its types , Madhya Mandra and Taar saptak .

I.3 Origin ans development of swar

Unit -II

2. Musical Terms

2.1 Raga , Vadi , Samvadi and Vivadi swar, Aroh ,Awroh ,pakad ,Samprakartik Raga , Gayan Samay

2.2 Khyal and its types Vilambit and Drut Khyal ,Bandish , Dhrupad ,Dhmar , Tarana,

Bhajan , Geet , Ghazal

Unit- III

3. Introduction to Taal

3.1 Ektaal ,Rupak , Deepchandi taal ,

3.2 Ability to write notation and demonstration on hands with Thah and dugun .

Unit- IV

4. Practical and Exercise

4.1 Ten Besic Alankars

4.2 Five film songs based on Aashraye ragas .

4.3 one Gazal or Bhajan with instruments.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHETRA UNIVERSITY KURUKSHETRA

Scheme and Syllabus

M.P.A. Honours
(Master of Performing Arts Honours 5 Years Integrated Programme)
W.E.F Session 2020-21 in Phased Manner

According to CBCS & LOCF
(CHOICE BASED CREDIT SYSTEM & LEARNING OUTCOME BASED CURRICULUM FRAMEWORK)

KURUKSHETRA UNIVERSITY
KURUKSHETRA
2020-21

1.Programme outcomes (P.O.) of the faculty of Indic Studies

1. Scientific & Logical knowledge of ancient Indian wisdom.
2. Enhancing knowledge of Indian cultural traditions.
3. Knowledge of Vedic, medieval &modern Philosophies.
4. Inculcation of nationalism and other Moral values.
5. Enhancing mental relaxation and peace by adopting prayer, chanting, yoga and meditation.
6. Preservation of Indian arts and heritage by using modern technologies.
7. To Impart knowledge of different sanskaras & philosophy.
8. Imparting knowledge of folk traditions in different disciplines of the faculty.
9. Developing aesthetics, creativity & skills like singing, painting, dancing.
10. Improving the emotional intelligence through Geeta .

2. Programme specific outcomes (PSO) of M.P.A

1. Imparts skill based education and Technical knowledge eg. sound recording and Music studio work.
2. Constructs strong foundation and in-depth knowledge of Classical Music.
3. Ability to work as professional musician.
4. Imparts knowledge of folk traditions.
5. Prepares students for advance research.

DEPARTMENT OF MUSIC AND DANCE
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SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner
1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Vocal) Ist Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAV 111A	Stage performance (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
	MPAV 111B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. IInd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAV 121A	Stage performance (Practical)	0+0+8	4	15 -20 min / Student		80	20	100
	MPAV 121B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

Department of Music & Dance
Kurukshetra University, Kurukshetra
MPA Music (Vocal) Semester- I

SYLLABUS AND COURSE OF READING according to CBCS LOCF

(W.E.F. 2020-21)

MPAV 111A STAGE PERFORMANCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 111A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**To build foundation and basic aptitude for performing as a vocalist**								
2.	**Enhances Creativity and Basic improvisation ability to perform various Hindustani classical forms .**								
3.	**Ability to perform various semi classical and Light music forms .**								
4.	**Enhance knowledge about different layas (tempo) and Talas of indian music .**								

Paper- I (Practical) Stage Performance

Note – Students are not allowed to sing with harmonium . Only Taanpura should be used to give swar in Examination.

Unit – 1

a) Five Alankars in Shuddha swaras .

Unit –II

b) One vilambit Khyal with Alaps and taans in any one Raga from prescribed Syllabus
   a) Bilawal b)Yaman

c) One Drut Khyal in each raga of syllabus with Alap and tans .

d) Viva and General Introduction of ragas.

Unit -III

e) One Bhajans based on ragas of syllabus.

f) National Anthem with instruments.

Unit -IV

g) Ability to Demonstrate Taals on hands with thah and Dugun layakaries –
   a) Teen taal b) Kaharwa

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

MPA Music (Vocal)Semester - I

SYLLABUS AND COURSE OF READING according to CBCS LOCF

(W.E.F. 2020-21)

MPAV 111B Musicology and General History of Music (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 111B	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
	Course Outcomes								
1.	**Enhance knowledge about basic terminology of music and scientific aspects of sound**								
2.	**Enhance knowledge about historical aspects of music during the period of Vedic to 12th century onwards and contribution of musicians**								
3.	**Enhances knowledge about basic terminology of taal and constructs ability to write and demonstrate talas on hands**								
4.	**Constructs ability to write notation of vilambit and drut khyals with taans and alaps .**								

Note- There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

Unit –I

1. Music and Sound

I.I Music and its types – Classical , Semi Classical , Folk Music and Light music.

I.2 Sound ,Musical Sound ,Vibration , Frequency.

I.3 Naad and its types Aahat naad ,Anahad Naad.Pitch Intansity ,Timber

1.4 Shruti ,swar ,Shuddha Swar, Vikrit Swar ,Varna , Alankar ,

Unit –II

2. History of Music

2.1 History of Music from Vedic Period to 12th Century

2.2 Contribution Towards music By the Following Musicians.

a) Pt Vishne Digamber paluskar, b) Pt V.N. Bhatkhende,

Unit-III

3. Introduction to Taal ,

3.1 Taal ,Theka , Avartan , Taali , Khali, Sam ,Vibhag.

3.2 Laya and its types Vilambit laya Madhya laya drut laya.

3.3 Detail description of following talas :

Teen Taal , kaharwa ,

3.4 Ability to write notation and demonstration on hands with Thah and Dugun .

Unit-IV

4. Practical and Exercise

4.1 Knoledge of Five Thaats of pt. Bhatkhande and introduction of their Aasraye Ragas .

4.2 Ability to write the notation in Vilambit and Drut Khyals with alaps and taans Bilawal, Yaman ,

4.3 General study and detail Description of ragas Prescribed in syllabus
4.4 National Anthem with notation

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

MPA Music (Vocal) Semester- II

SYLLABUS AND COURSE OF READING according to CBCS LOCF

(W.E.F. 2020-21)

MPAV121A STAGE PERFORMANCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 121A	**4**	**100**	**80**	**20**	**15-20 Minutes/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhance knowledge about basic terminology of music and scientific aspects of sound**								
2.	**Enhance knowledge about historical aspects of music during the period of Vedic to 12th century onwards and contribution of musicians**								
3.	**Enhance knowledge about basic terminology of taal and constructs ability to write and demonstrate talas on hands**								
4.	**Constructs ability to write notation of vilambit and drut khyals with taans and alaps .**								

Note – Students are not allowed to sing with harmonium , Taanpura should be used to give swar in Examination.

Unit –I

1. Ten Alankars in Shuddha swaras

Unit –II

2.One vilambit Khyal with Alaps and taans in any one Raga from prescribed Syllabus

a) Durga b) Bhupali

3. One Drut Khyal each raga of syllabus with Alap and taans.

4. Viva and General Introduction of ragas.

Unit –III

5. One Bhajans based on ragas of syllabus.

6. National Song with instruments.

Unit –IV

7. Ability to Demonstrate Taals on hands with thah and Dugun layakaries

Ek taal , Dadra

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

MPA Music (Vocal)Semester - II
SYLLABUS AND COURSE OF READING according to CBCS LOCF
(W.E.F. 2020-21)

MPAV 122B Musicology and General History of Music(Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 121B	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
	Course Outcomes								
1.	**Enhances knowledge about basic terminology of music**								
2.	**Enhances knowledge about various musical forms and contribution of musicians.**								
3.	**Develops ability to write notation and demonstrate talas on hands**								
4.	**Enhances knowledge about practical aspects of music**								

Note- There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

Unit –I

1. Aspects of Music and Different terms

I.I Aspects of music ,practical and theory
I.2 Saptak and its types , Madhya, Mandra and Taar saptak
I.3 Raga , Vadi , Samvadi and Vivadi swar, Aroh ,Awroh ,pakad ,Samprakartik Raga , Gayan Samay

Unit -II

2. **History of Music**

2.1 Khyal and its types Vilambit and Drut Khyal ,
2.2 Bandish , Dhrupad ,Dhmar , Tarana, Bhajan , Geet , Gazal
2.3. Contribution Towards music By the Following Musicians.
a) Pt Omkar nath Thakur b) Ustad Abdul Karim Khan,

Unit- III

3**. Introduction to Taal**
3.1 Meaning , Defination and Importance of Taal
3.2 Detailed study of following talas :
Ektaal ,Dadra ,
3.2 Ability to write notation and demonstration on hands with Thah and dugun .

Unit- IV

4. Practical
4.1 Knowledge of Ten Thaats of pt. Bhatkhande and introduction of their Aasraye Ragas .
4.2 General study and detail Description of ragas Prescribed in syllabus
Durga , Bhupali
4.3 Ability to write the notation in Vilambit and Drut Khyals .
4.4 National song with notation

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2021-22

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Vocal) IIIrd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAV 231A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAV 231B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. IVth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAV 241A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAV 241B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA IIIrd Sem Music (vocal)
(W.E.F. 2021-22)

MPAV231A STAGE PERFORMANCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 231A	**4**	**100**	**80**	**20**	**15-20 min/ Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**To build foundation and basic aptitude for performing as a vocalist**								
2.	**Enhances Creativity and Basic improvisation ability to perform verious Hindustani classical forms .**								
3.	**Ability to perform various semi classical and Light music forms .**								
4.	**Enhance knowledge about different layas (tempo) and Talas of indian music .**								

Note – Students are not allowed to sing with harmonium , Taanpura should be used to give swar in Examination.

Unit -I

h) Five alankars in vikrit swaras

Unit -II

i) One vilambit Khyal with Alaps and taans in any one Raga from prescribed Syllabus Bhairav , Bhairavi , Kafi
j) One Drut Khyal each raga of syllabus with Alap and tans
k) Viva and General Introduction of ragas.

Unit -III

l) One Bhajan / Shabad based on ragas of syllabus.
m) Two Saraswati vandana with instruments.

Unit -IV

n) Ability to Demonstrate Taals on hands with thah and Dugun layakaries Tilwara , Tivra, Rupak

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
(W.E.F 2021-22)
MPA Music (vocal) IIIrd Semester

MPAV 231B Musicology and General History of Music (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 231B	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Construct basics principles and fundamentals of Indian classical music .**								
2.	**Develops aptitude about the application of Basic Terminology of music and various theories of Indian classical music .**								
3.	**Develops ability to write notation and ability to demonstrate talas on hand**								
4.	**Imparts knowledge about various Vocal forms and contribution of musician .**								

Note- There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

Unit – I Musicology and General History of Music

a) History of Indian music in Medieval Period
b) Placement of Swaras on Shruties by Bharat ,Matang, Loochan,Pundrik Vitthal and Ramamatya
c) Study of following Musical treatise :
Pranav Bharati, sangeetanjali

Unit – II Short notes on musical terms and musical forms

a) Jaties of ragas
b) Tanpura and Sahayak Naad
c) Avirbhav –Tirobhav, Nayak-Nayaki,

Unit – III Detail study of Raga and Tala

a) Ability to write Notation with detail description of Vilambit and Drut khyal with two alaps and taans.

b) Detail Description and comparative study of ragas prescribed in syllabus
Bhairav , Bhairavi , Kafi

c) Study of following talas with detailed Demonstrate inThah Dugun and Tigun layakaries :

Tilwara , Tivra, Rupak

Unit – IV Musical Forms and Biographies

a) Musical Forms

1.Dhrupad

2.Dhmar

3.Trivat

4. Chaturang

4) Biographies

1. Ustad Bade Gulam Ali Khan
2. Ustad amir Khan
3. Ustad Mallikarjun mansoor

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
(W.E.F 2021-22)
M.P.A. Music (vocal) Semester – IV

MPAV241A STAGE PERFORMANCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 241A	**2**	**100**	**80**	**20**	**15-20 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhance Creativity and Basic improvisation ability in students .**								
2.	**Develop confidence to perform as a musically mature and sensible artist .**								
3.	**Develop ability to perform various classical and Light music forms .**								
4.	Develop ability to demonstrate various Talas on hands								

Note – Students are not allowed to sing with harmonium , Taanpura should be used to give swar in Examination.

Unit -I

a) Five Alankars in vikrit swaras

Unit -II

a) One vilambit Khyal with Alaps and taans in any one Raga from prescribed Syllabus

   Malkauns , Kedar , Khmaj

b) One Drut Khyal each raga of syllabus with Alap and tans

c) Viva and General Introduction of ragas.

Unit -III

a) One Bhajans based on ragas of syllabus.
b) Two Prayers with instruments

Unit -IV

c) Ability to Demonstrate Taals on hands with thah and Dugun layakaries -- Ada Chautaal , Deepchandi,

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
(W.E.F 2021-22)
MPA Music (vocal) IVth Semester

MPAV 241B Musicology and General History of Music (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 241B	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhance Knowledge about Historical musical treatise and Development of music in modern period.**								
2.	**Enhance knowledge about basic musical terms**								
3.	**Enhance knowledge about Prescribed ragas and talas with the ability to write notation .**								
4.	**Enhance knowledge about classical vocal forms and contribution of famous personalities of classical music .**								

Note- There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

Unit – I History of Indian music

a) History of Indian music in Modern Period
b) Placement of Swaras on Shruties by Pundrik Vitthal and Ramamatya
c) Study of following Musical treatise :
Kramik Pustak Malika, sangeet Chintamani

Unit – II Breif study of following Musical Terms

a) Gram
b) Murchhchhna
c) Alankar
d) Varn

Unit – III study of raga and tala with notation system

b) Ability to write Notation with detail description of Vilambit and Drut khyal with two alaps and taans.
Malkauns , Kedar , Khmaj

c) Detail Description and comparative study of ragas prescribed in syllabus

d) Study of following talas with detailed Demonstrate inThah Dugun and Tigun layakaries :

Ada Chautaal , Deepchandi,

Unit – IV Musical Forms and Biographies

a) Musical Forms

1.Khyal
2. Thumari
3.Tarana
4.Tappa

b) Biographies

1. Pt. Bhimsen Joshi
2. Ustad Allauddin khan
3. Ustad Faiyaz Khan

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Vocal) Vth Semester
Discipline Specific Course (DSC)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Course (DSC)	MPAV 351A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAV 351B	Musicology & General History of Music(Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. Music Vocal , VIth Semester
Discipline Specific Course (DSC)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Course (DSC)	MPAV 361A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAV 361B	Musicology & General History of Music(Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
M.P.A. Music (vocal) Semester –Vth
(W.E.F 2022-23)

MPAV351A STAGE PERFORMANCE (Practical)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 351A	**4**	**100**	**80**	**20**	**15-20 min/ hours**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**To build foundation and basic aptitude for performing as a vocalist**								
2.	**Enhances Creativity and Basic improvisation ability to perform verious Hindustani classical forms .**								
3.	**Ability to perform various semi classical and Light music forms .**								
4.	**Enhance knowledge about different layas (tempo) and Talas of indian music .**								

Note – Students are not allowed to sing with harmonium , Taanpura should be used to give swar in Examination.

Unit – I

a) Five Alankars in vikrit swaras

b) Unit – II

a) One vilambit Khyal with Alaps and taans in any one Raga from prescribed Syllabus Todi, Vrindavani Sarang , Jaijaivanti , Bihag

b) One Drut Khyal each raga of syllabus with Alap and tans

c) Viva and General Introduction of ragas.

Unit – III

a) One Bhajans / Shabad based on ragas of syllabus.

b) Two Saraswati vandana with instruments.

Unit – IV

a) Ability to Demonstrate Taals on hands with thah and Dugun layakaries -- Jat taal , Teen Taal, Kaharwa

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA Music (vocal) – Vth Semester
(W.E.F 2022-23)

MPAV 351B Musicology and General History of Music (Theory)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**Major Test**	**Minor Test**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 351B	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
Objects /Purpose	**To provide a Foundation & enhance the Knowledge about Basic principles and Fundamentals of Indian Classical Music and their Application**								
	Course Outcomes								
1.	**Enhance knowledge about development of music during 15Th to 17th century onwards also enhance knowledge about famous musical treatise.**								
2.	**Essays on Important aspects of music and classification of music.**								
3.	**Enhance knowledge about prescribed ragas and talas with ability to write notation with alaps and taans.**								
4.	**Enhance knowledge about classical vocal forms and contribution of famous personalities of classical music.**								

Note- There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

Unit – I History of Indian music

d) Historical survey of Indian music from15th century to 17th century
e) Origin and development of notation system, merits and demerits of notation system
f) Study of following Musical treatise :
Natya Shastra , Sangeet Ratnakar

Unit – II Musical Terms and Short notes

a) Lalit kalaon mein sangeet ka sathan
b) Voice culture
c) Elementary knowledge of folk music of Haryana.
e) Classification of instruments during vedic period to Medieval period

Unit – III Detail study of raga and tala with notation

d) Ability to write Notation with detail description of Vilambit and Drut khyal with two alaps and taans.

e) Detail Description and comparative study of ragas prescribed in syllabus

Todi, Vrindavani Sarang , Jaijaivanti , Bihag

f) Study of following talas with detailed Demonstrate inThah Dugun and Tigun layakaries :

Jat taal , Teen Taal, Kaharwa

Unit – IV Musical Forms and Biographies

a) Musical Form

i) Prabandh

ii) Giti

b) Biographies

a) Pt. Vinayak Rao patvardhan

b) Krishana Rao Shankar pandit

c) Pt. D V Paluskar

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA Music (vocal) – VI th Semester
(W.E.F 2022-23)

MPAV361A STAGE PERFORMANCE (Practical)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**Major Test**	**Minor Test**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 361A	**4**	**100**	**80**	**20**	**15-20 min / student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**To build foundation and basic aptitude for performing as a vocalist**								
2.	**Enhances Creativity and Basic improvisation ability to perform various Hindustani classical forms .**								
3.	**Ability to perform various semi classical and Light music forms .**								
4.	**Enhance knowledge about different layas (tempo) and Talas of Indian music .**								

Note – Students are not allowed to sing with harmonium , Taanpura should be used to give swar in Examination.

Unit – I

a) Five Alankars in vikrit swaras

Unit – II

a) One vilambit Khyal with Alaps and taans in any one Raga from prescribed Syllabus

   Shuddha Kalyal , Madhumad Sarang , Bhimpalsi , deshkar

b) One Drut Khyal each raga of syllabus with Alap and taans

c) Viva and General Introduction of ragas.

Unit – III

a) One Bhajans / Shabad based on ragas of syllabus.

b) Two Saraswati vandana with instruments.

Unit – IV

a) Ability to Demonstrate Taals on hands with thah and Dugun layakaries

   Dhamar, Sultaal, Jhap Taal

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA Music (vocal) – VI th Semester
(W.E.F 2022-23)

MPAV 361B Musicology and General History of Music (Theory)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**Major Test**	**Minor Test**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAV 361B	**2**	**50**	**40**	**10**	**3**	**2**	**0**	**0**
	Course Outcomes								
1.	**Enhance knowledge about development of music during 17th century to modern period also enhance knowledge about famous treatise of music .**								
2.	**Enhance knowledge about folk music of Punjab .**								
3.	**Enhance knowledge about prescribed ragas and talas and constructs ability to write notation with alap and taans .**								
4.	**Enhance knowledge about classical vocal forms and contribution of famous personalities of classical music .**								

Note- There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers whole syllabus. All questions Carry equal marks.

Unit – I History of Indian music

a) Historical survey of Indian music from17th century to Modern period.
b) Critical analysis of time theory of ragas.
c) Study of following Musical treatise :
Sangeet Parijat ,Sangeet Darpan

Unit – II Musical Terms and Short notes

a) Elementary knowledge of folk music of Punjab
b) Classification of instruments during Medieval period to Modern period.

Unit – III Detail study of raga and tala with notation

a) Ability to write Notation with detail description of Vilambit and Drut khyal with two alaps and taans.
b) Detail Description and comparative study of ragas prescribed in syllabus
Shuddha Kalyal , Madhumad Sarang , Bhimpalsi , deshkar
c) Study of following talas with detailed Demonstrate inThah Dugun and Tigun layakaries :

Dhamar, Sultaal, Jhap Taal

Unit – IV Musical Forms and Biographies

a) Musical Forms

a) Jati Gayan c) Gazal

b) Bhajan b) Geet

b) Biographies

a) Gangu Bai Hangal

b) Acharya K.C.D. Brahspati

c) Pt. lal mani Mishra

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2023-24

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Vocal) VIIth Semester

Papers Category	**Code**	**Nomenclature**	**L+T+P**	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MPAV 411	History of Indian Music& Musicology	4+0+0	4	3 Hours	80		20	100
Core-2	MPAV 412	Principle and Techniques of Stage performance & Recording studio work	4+0+0	4	3 Hours	80		20	100
Core-3	MPAV 413	Stage performance (Practical)	0+0+8	4	30-35 Min/ student		80	20	100
Core-4	MPAV 414	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 Min/ student		80	20	100
Core Elective-5	MPAV 415	Project Work (Practical)	0+0+4	4	30-35 Min/ student		80	20	100
Total			28	20		160	240	100	500

M.P.A (Vocal) VIIIth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAV 421	History of Indian Music& Musicology (Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MPAV 422	Principle and Techniques of Stage performance & Recording studio work (Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MPAV 423	Stage performance (Practical)	0+0+8	4	30-35 Min/ student		80	20	100
Core-4	MPAV 424	Viva –Voce & Comparative Study of Ragas (Practical)	0+0+8	4	30-35 Min/ student		80	20	100
Core Elective-5	MPAV 425	Project Work (Practical)	0+0+4	4	30-35 Min/ student		80	20	100
Open Elective	OEM1	General History and Basics of Indian Music -1(Theory)	2+0+0	2	3 Hours	40		10	50
Total			30	22		200	240	110	550

DEPARTMENT OF MUSIC AND DANCE

KURUKSHERTRA UNIVERSITY KURUKSHETRA

MPA Music (Vocal) Semester- VII

(W.E.F. 2023-24)

MPAV 411 History of Indian Music &Musicology (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAV 411**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Enhances knowledge about historical development of music during Vedic period to 13th century.**								
2.	**Enhances knowledge about prescribed ragas and talas of Indian classical music**								
3.	**Enhances knowledge about relationship of music with different interdisciplinary aspects or areas.**								
4.	**Enhances knowledge about classification of Indian musical instruments.**								

Note : There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type , compulsory, and covers the whole syllabus. All questions Carry equal marks.

Unit -I **History of Indian music**

(a) History of Indian Classical Music from Vedic period to13th century.

(b) Nature, concept and classification of Jati as prescribed by Bharat, Matang and Sharangdeva,

Unit –II Detailed description of raga and taal with notation

(a)Ability to write notation of Vilambit & Drut Khyal of the following Ragas along-with a few Alap, Tanas and Bol –Tanas, with a capacity to write the Notation in

Bhatkhande or Vishnu digambar Notation System.

Shyam-Kalyan and Puriya-Kalyan, Devgiri-Bilawal and Yamani-Bilawal, Ahir-Bhairava - Nata-Bhairava,

Yaman, Alhaiya-Bilawal, Bhairava

(b) A study of the following Talas and ability to Write them in Ekgun, Dugun,Tigun&ChaugunLaykaries .

Teen-Taal,Rupak, Deepchandi,

Unit III Essays on music

(a)Relation of Raga with season and Time.

(b)Relationship of Folk and Classical Music.

(c) Relationship between Music and Rhythm.

Unit-IV Classification of Indian music instruments

(a) Classification of Indian Musical Instruments.

(b) Historical Knowledge of the following Musical Instruments:

Veena , Sitar ,Taanpura, Pakhawaj ,Tabla,Vanshi, Kartal and Manjira.

MPA Music (Vocal) Semester- VII

(W.E.F. 2023-24)

MPAV412 Principle and Techniques of Stage performance & Recording studio work (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAV 412**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To Construct foundation about Principle and Techniques of Stage performance and basic aspects of recording studio work in music .**								
	Course Outcomes								
1.	**Imparts knowledge regarding Principles and Techniques of Stage performance and other aspects of Indian classical music**								
2.	**Gives awareness about recording studio work in music .**								
3.	**Gives awareness about role and importance of media in music .**								
4.	**Knowledge about education system of music in Gharanas and educational institution.**								

Note:- There shall be **nine** Questions , Two questions from each Unit . Question no one is objective type and compulsory, covers whole syllabus . The candidates shall be required to attempt **five** questions in all, selecting **one** question from each unit. All questions Carry equal marks .

.**Unit-1Basic Principle of Stage Performance**

(a) Historical perspective of stage performance in the field of music.
(b) Essential elements for a successful stage performance
(c) Interrelationship between audience and performer .

Unit-II Principles & Techniques of Recording (Audio/Video)

(a) Definition of Recording.
(b) Origin and development of recording system.
(c) Importance of Recording place (Open & Studio)

Unit-III Music and Media

(a) Importance of Radio in Popularizing the Indian Music.
(b) Importance of Television in Popularizing the Indian Music.
(c) Impact of New media .

Unit- IV Comparative Study of the teaching system of Music from Ancient to Modern Time.

(a). Teaching of Music in Gharanas.
(b). Teaching of Music in SangeetVidyalyas, Mahavidyalyas and Vishwavidyalyas.

MPA Music (Vocal) Semester- VII

(W.E.F. 2023-24)

MPAV413 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAV 413**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances Creativity and Systematic improvisation ability in students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms as Thumri and Dadra .**								
4.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								

1. Students are required to prepare any **One** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes including Alap – bol alaps, Taan-bol taan behlava, laya bant-bolbant Vilambit-Khyal, Drut-Khyal and Tarana are required to be presented.

   Shyam-Kalyan and Shuddha Sarang, Devgiri-Bilawal and Yamani-Bilawal,
   Ahir-Bhairava and Nata-Bhairava
   Yaman, Alhaiya-Bilawal, Bhairava

   20+10+10=40

2. One Dhrupad or One Dhamar or Sadra along with layakries or Upaj are to be performed in the Ragas prescribed for Practical paper. It is recommended that Pakhawaj Accompaniment may be provided for **Dhrupad** or **Dhamar** singing. 10

3. One Thumari /Dadra/ in Bhairavi or kafi raga, or in any prescribed ragas. 10

4. Ability to demonstrate talas of prescribed syllabus on hands and tabla.

   Teen taal ,Rupak ,Deepchandi 10

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MPA Music (Vocal) Semester- VII

(W.E.F. 2023-24)

MPAV 414 Viva-Voce & Comparative Study of Ragas(Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAV 414**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Increases confidence to perform as a mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhances the skills to make notation and improvise ragas with their creativity**								
3.	**Enhances knowledge and ability to demonstrate prescribed talas on hands.**								
4.	**Develops ability to tune instruments .**								

1. Students are required to prepare atleast 5 ragas with detailed description and has to present one raga with complete presentation with vilambit khyals ,and drut khyal with alaps ,bol -alaps,taans- boltaans , laya-baant –bol-bant, behlawas etc, 30
2. Comparative study of ragas with practical demonstration-cum-viva-voce examination . 30
3. Ability to demonstrate the Talas on hands and Tabla as prescribed in syllabus . 10
4. Capacity of Tunning the instruments like Tanpura , Sitar , Tabla etc 10

MPA Music (Vocal) Semester- VII

(W.E.F. 2023-24)

MPAV 415 PROJECT WORK (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAV 415**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performance , improvisation ,**								
2.	**Enhances the ability to compose and records new musical compositions.**								
3.	**Imparts Knowledge to use Studio tools and equipment.**								
4.	**Imparts Knowledge of various recording Software .**								

1. Student has to prepare one project on following areas ,and has to submit a project report in a print form before practical exam .

   Areas for project :

   a) Hindustani / South Indian Classical

   b) Semi Classical Music

   (a) Folk Music

   (b) Light Music

   (c) Western Music

   (d) Sufi / Devotional Music

   i. One Documentary with the help of Movie maker , basic recorder and editing tools , with printed project report

   ii. Coverage of musical competitions, concerts /event with written report and video cd . 20+10=30

2. Self Composed /arranged/ programmed Musical Composition or creative work etc. in audio or video form , will be Submitted and Presented by the student in practical exam . 10+10+10
3. Knowledge of Various Studio Tools and Equipment's 10
4. Practical Knowledge of Recording-Studio and Software by the Candidate. 10

   (a). Sound Forges

   b) Movie Maker

MPA Music (Vocal) Semester- VIII

(W.E.F. 2023-24)

MPAV 421 History of Indian Music & Musicology (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAV 421**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Enhances knowledge about Historical aspects of Indian music**								
2.	**Develops ability to write notation in Various forms of Indian classical music .**								
3.	**Imparts knowledge about interdisciplinary and related areas of music.**								
4.	**Knowledge about Gharana system in Indian music**								

Note: - There shall be **Nine** Questions in all. The candidates shall be required to attempt **FIVE** questions in all, selecting one question from each unit. Question no. one is objective type and compulsory, and covers the whole syllabus. All questions Carry equal marks.

Unit -I **Historical aspects of Indian music**

(a) Study of ten essentials of Ragas as described in the ancient text and their application to Medieval and Modern music systems.

(b) Contribution to Indian Classical Music of following Musician Bharat, Dattil, Matang and Pt. Sharangdeva.

Unit –II **Detailed demonstration of Raga and taal System**

(a) Ability to write notation of Vilambit & Drut Khyal of the Ragas prescribed in the syllabus along-with a few Alap, Tanas and Bol –Tanas, with a capacity to write the Notation in

Bhatkhande or Vishnu Digambar Notation System.

Bageshwari - Rageshwari, - Madhumad Sarangs - Vrindavani-Sarang

Marwa - Puriya , Kafi, Bihag,

(b) A study of the following Talas and ability to Write them in Ekgun, Dugun,Tigun&ChaugunLaykaries .

Ek-Taal, Jhap-Taal&Kaharwa

Unit III **Essays on interdisciplinary areas of music**

(a) Music and Psychology.

(b) Music and science

(c) Music and religion

Unit-IV **GharanaTredition in Indian Classical music**

(a) Gharanas Tradition in Indian classical music.

(b)Study of differentGharanas of Khyal gayaki .

(c) merits and demerits of Gharana system.

MPA Music (Vocal) Semester- VIII

(W.E.F. 2023-24)

MPAV422 Principle and Techniques of Stage performance & Recording studio work (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAV 422**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**knowledge regarding Principle and Techniques of Stage performance and other aspects of Indian classical music**								
2.	**To spread Awareness about the role and importance of media in music .**								
3.	**Awareness about recording studio work in music .**								
4.	**Enhances knowledge about teaching system in music in ancient and modern period.**								

Note:- There shall be **nine** Questions, Two questions from each Unit . Question no one is Objective type , compulsory and cover the whole syllabus . The candidates shall be required to attempt **five** questions in all, selecting **one** question from each unit. All questions Carry equal marks.

.**Unit-1Basic Principle of Stage Performance**

(a) Basic essential elements for a good performance of classical /light / folk music

(b) Role of Accompanying Artistes in the Stage Performance classical /light /folk music

Unit-II Principles & Techniques of Recording (Audio/Video)

(a) Detailed description of a Modern Studio.

(b) Description of L.P. Recording, Tape cassettes, CD/D.V.D, Micro Chip etc.

(c) Sound Production & Use of Microphone.

Unit-III Music and Media

(a)Importance of Computer & Internet for Music.

(b) Importance of Print Media for Music (Books, Newspapers, Magazines, Journals etc)

Unit- IV Comparative Study of the teaching system of Music from Ancient to Modern Time.

(a) Teaching of Music in schools

(b) Teaching of music in colleges
(c) Teaching of music in Universities

MPA Music (Vocal) Semester- VIII

(W.E.F. 2023-24)

MPAV423 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAV 423**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances Creativity and Systematic improvisation ability among students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhance knowledge and ability to demonstrate prescribed talas on hands.**								

1. Students are required to prepare any **One** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes including Alap ,bol alaps, Taan, bol taan, behlava, laya bant ,bol bant Vilambit-Khyal, Drut Khyal and Tarana are required to be presented.

Bageshwari - Rageshwari, Madhumad Sarang-Vrindavani-Sarang.

Kafi, Bihag, Marwa and Puriya. 20+10+10=40

2. One Dhrupad or One Dhamar or Sadra along with layakries or Upaj are to be performed in the Ragas prescribed for Practical paper. 10

3. One Thumari or Dadra in Bhairavi or kafi raga . 10

4. Ability to demonstrate talas of prescribed syllabus on hands and table.

Ek-Taal, Jhap-Taal&Kaharwa 10

MPA Music (Vocal) Semester- VIII

(W.E.F. 2023-24)

MPAV424 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAV 424**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Develops confidence to perform as a musically mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhance the skills to make notation and improvise ragas with their creativity**								
3.	**Constructs Ability to tune various Instruments .**								
4.	**Ability to Campose bandish**								

1. Students are required to prepare atleast 5 ragas with detailed description and has to present one detailed raga with complete presentation with vilambit khyal ,and Drut khyal with bolalaps ,alaps ,tans, bol taans ,taans etc, 30

2. comparative study of ragas of prescribed syllabus with practical demonstration-cum-viva-voce examination. 30

3. Ability to demonstrate the Talas on hands and Tabla prescribed in syllabus .

4. Capacity of Tuning the instruments 10

5. Ability to compose bandish in prescribed ragas. 10

MPA Music (Vocal) Semester- VIII

(W.E.F. 2023-24)

MPAV 425 PROJECT WORK (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAV 425**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**4**	**0**	**4**
	Objects/Purpose								
	To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self-dependent in various areas i.e. performance , improvisation ,**								
2.	**Enhances the ability to compose and records new musical compositions.**								
3.	**Imparts Knowledge to use Studio tools and others equipment.**								
4.	Imparts knowledge of various recording Software.								

1. Student has to prepare one project on following areas ,and has to submit a project report /dissertation in a print form before practical exam .

Areas for project :

c) Classical

d) Semi Classical Music

(e) Folk and Light Music

(f) Western Music

(g) Devotional /Sufi music

a) Documentary with printed project report

or

b) Coverage of musical competition, concerts /event in written report and video cd to be submitted .

or

c) Power-point presentation of any theoretical topic with some new area or idea in consultation with teacher . 30

2. Self Composed /arranged /programmed Musical Composition or creative work etc. in audio or video form , will be Submitted and Presented by the student in practical exam . 10+10+10

3. Knowledge about Stereo Miking for Recording Purpose 10

4. Practical Knowledge of Recording-Studio and Software by the Candidate.10

Nuendo , Pro Tools

DEPARTMENT OF MUSIC AND DANCE
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SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2024-25

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

MPA (Vocal) IXth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAV 531	Interdisciplinary Aspects of Music (Theory)	4+0+0	4	3	80		20	100
Core-2	MPAV 532	Voice Modulation, voice culture &Application of sound in Indian Music (Theory)	4+0+0	4	3	80		20	100
Core-3	MPAV 533	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAV 534	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 min/ Student		80	20	100
Core Elective-5	MPAV 535	Project Work (Practical)	0+0+4	4	30-35 min/ Student		80	20	100
Open Elective	OEM2	General History and Basics of Indian Music -2(Theory)	2+0+0	2	3	40		10	50
Total			30	22		200	240	110	550

MPA (Vocal) Xth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAV 541	Interdisciplinary Aspects of Indian Classical Music(Theory)	4+0+0	4	3	80		20	100
Core-2	MPAV 542	Techniques of Composition and Research Methodology(Theory)	4+0+0	4	3	80		20	100
Core-3	MPAV 543	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAV 544	Viva –Voce & Comparative Study of Ragas(Practical)	0+0+8	4	30-35 min/ Student		80	20	100
Core Elective-5	MPAV 545	Project Work (Practical)	0+0+4	4	30-35 min/ Student		80	20	100
Total			28	20		160	240	100	500

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA Music (Vocal)Semester –IX
(W.E.F. 2024-25)

MPAV 531 Interdisciplinary Aspects of Music (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAV 531**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
1.	**Enhances knowledge about interdisciplinary aspects of music**								
2.	**Enhances knowledge about spiritual aspects of music and music therapy**								
3.	**Enhances knowledge about psychological aspects of music**								
4.	**Enhances knowledge about Aesthetical aspects of music.**								

Note : There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type , compulsory, and covers the whole syllabus. All questions Carry equal marks.

Unit-I Interdisciplinary Aspects of Music

a) Relation of Music with Mathematics

b) Interrelationship of Fine Arts with special reference to Rag – Ragini Paintings, Dhyan of Ragas and others.

Unit –II Music Therapy

a) Music Therapy and Healing Through Music

b) Music and meditation

c) Music and Yoga

Unit-III– Relationship of Music with other fields

a) Music and Spirituality

b) Music and psychology

c) Relation of music with Society

Unit -IV Music and Aesthetics

a) Principles of Aesthetics

b) Aesthetics in Music

c) Indian and Western theories regarding Aesthetics

d) Detailed description of Rasa theory

e) Rasa theory and its application to Indian Music.

f) Rasa theory in ancient musical Treatise .

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MPA Music (Vocal)Semester –IX
(W.E.F. 2024-25)

MPAV 532 Voice Modulation, voice culture & Application of sound in Indian Music (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAV 532**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
Objects /Purpose	**To enhance the Knowledge about Voice Modulation, voice culture &Application of sound in Indian Music .**								
	Course Outcomes								
1.	**Enhances knowledge about scientific aspects of music and application of sound in Indian Music**								
2.	**Develops aptitude about the application of Various theories and techniques regarding Voice Modulation, voice culture**								
3.	**Imparts knowledge about techniques of Riyaz .**								
4.	**Constructs ability to write notation in various forms of music and ability to write and demonstrate talas on hand**								

Note : There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type , compulsory, and covers the whole syllabus. All questions Carry equal marks.

Unit-I Introduction to sound

a) Definition Meaning and Development of Sound.
b) Different types and elements of sound
c) Characteristics of sound .
d) Short notes on following:
   Major tone , minor tone , Vibration , Frequeancy, wave , Resonance

Unit-II - Traditional Voice culture

a) Meaning and Definition of Voice culture
b) Concept of voice culture in historical musical treatise.
c) Voice culture in modern times.
d) Process of Voice-Production human body.
e) Meaning and role of Voice modulation

f) Voice Modulation In Different Musical Zoners

Classical ,semi classical , light Music, folk Music , playback Singing.

Unit-III – Concept of Riyaz

(a) Meaning and Defination of Riyaz.

(b) Concept of swarabhyas in Indian music

(c) Different steps and techniques of Riyaz in Indian music

(d) Importance of Riyaz in classical music

Unit-IV Detail study and notation system of Raga and Tala .

(a) Ablity to write notation and detailed description of ragas of prescribed syllabus.

Maru bihag –Nat Bihag, Bilaskhani todi- Miyan Ki Todi, Madhukauns – Chandrakauns, Darbari, Malkauns,Shuddha kalyan

(b) A study of the following Talas and ability to write them in Ekgun, Dugun , Tigun & Chaugun Layakaries:

Dhamar , Sool Taal , Chautal , Ada-chautal, Tilwara , Tivra Taal.

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MPA Music (Vocal)Semester –IX
(W.E.F. 2024-25)

MPAV 533 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAV 533**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances Creativity and Systematic improvisation ability among students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhance knowledge and ability to demonstrate prescribed talas on hands.**								

1. Students are required to prepare any **One** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes including Alap, Taan, boltaan behlava, layabant -bol bant Vilambit Khyal, Drut Khyal and Tarana are required to be presented.

   Maru bihag –Nat Bihag, Bilaskhani todi- Miyan Ki Todi, Madhukauns – Chandrakauns, Darbari, Malkauns,Shuddha kalyan 20+10+10=40

2. One Dhrupad or One Dhamar or Sadra along with layakries or Upaj are to be performed in the Ragas prescribed for Practical paper. It is recommended that Pakhawaj Accompaniment may be provided for **Dhrupad** or **Dhamar** singing.

   20

3. One Thumari or Dadra in Pilu or Jhinjhoti raga . 10

5. Ability to demonstrate talas of prescribed syllabus on hands and tabla.
   Dhamar , Sool Taal , Chautal 10

MPA Music (Vocal)Semester –IX
(W.E.F. 2024-25)

MPAV 534 Viva-Voce & Comparative Study of Ragas (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAV 534**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform , comparatively demonstrate and differentiate the Ragas of prescribed syllabus .**								
	Course Outcomes								
1.	**Develops confidence to perform as a musically mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhance the skills to make notation and improvise ragas with their creativity**								
3.	**Constructs Ability to tune various Instruments .**								
4.	**Enhances ability to compose bandish**								

1.Students are required to prepare atleast 5 ragas with detailed description and has to present one raga with complete presentation with vilambit khyal and drut khyal ,tarana with alaps - bolalaps, tans- boltaans , layabant bolbant behlawa etc, 20

2. Comparative study of ragas with practical demonstration-cum-viva-voce examination 30

3. Ability to demonstrate the Talas on hands and Tabla as prescribed in syllabus . 10

4. Capacity of Tuning the particular instrument . 10

5. Ability to compose a bandish or composition with lyrics given by examiner in paper in exam. 10

MPA Music (Vocal)Semester –IX
(W.E.F. 2024-25)

MPAV 535 PROJECT WORK (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAV 535**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performance , improvisation ,**								
2.	**Enhances the ability to compose and records new musical compositions.**								
3.	**Imparts Knowledge to use Studio tools and others equipment.**								
4.	**Imparts knowledge of various software of studio work**								

1. Student has to prepare one project out of following areas ,and has to submit a project report in a print form before practical exam . 20+20

   Areas for project :

   a) Classical

   b) Semi Classical Music

   (c) Folk and Light Music

   (d) Western Music

i) Documentary with printed project report

or

ii) Coverage of musical competition, concerts /event in written report and video cd .

2. Self Composed /arranged Musical Composition or creative work in above mentioned areas , in audio or video form , will be Submitted and Presented by the student in practical exam . 30
3. Musical Arrangement/Programming by the Candidate for Light Music in One Composition.

   10
4. Knowledge of various software of studio work
   Q base

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA Music (Vocal)Semester –X
(W.E.F. 2024-25)

MPAV 541 Interdisciplinary Aspects of Indian Classical Music (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAV 541**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Enhances knowledge about various aspects of South Indian classical music**								
2.	**Enhances knowledge about various aspects of Ravindra Sangeet .**								
3.	**Imparts knowledge about various forms of classical Dance forms of India**								
4.	**Enhances knowledge about various Interdisciplinary Aspects of Music .**								

Note : There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type , compulsory, and covers the whole syllabus. All questions Carry equal marks.

Unit-I Study of Karnatak Music

a) Brief study of Karnatac Music and
b) Musical Forms of Karnatac Music
c) Elemantary knowledge of Karnatac Taal System
d) Popular instruments of karnatac music
e) Comparative study of karnatac Music with Hindustani Classical music

Unit-II Study of Rabindra Sangeet

a) Brief study of Rabindra Sangeet
b) Musical Forms of Rabinder Sangeet
c) Talas of Rabinder sangeet
d) Popular instruments used in Rabindra Sangeet

Unit-III Elementary knowledge of Indian Classical Dances

Elementary knowledge of Indian dances

i) Kathak
ii) Bharatnatyam
iii) Kuchipudi
iv) Oddissi
v) Kathakali

Unit-IV Essays on Music

a) Globalisation and Indian music
b) Role of Music In National Integration
c) Role of music in all round development of child
d) Suggestions for popularizing Indian Classical music in schools and colleges.
e) Role of music for Employability
f) Role of Music in Popularising Geeta

DEPARTMENT OF MUSIC AND DANCE
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MPA Music (Vocal)Semester –X
(W.E.F. 2024-25)

MPAV 542 Techniques of Composition and Research Methodology (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAV 542**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Enhances knowledge about development of composition and Improvisation in Ancient and Modern period**								
2.	**Enhances knowledge about tala system in Hindustani and Karnatak music system**								
3.	**Enhances knowledge about research methodology in music.**								
4.	**Enhances knowledge about Western Music**								

Note : There shall be Nine Questions in all. The candidates shall be required to attempt five questions in all, selecting one question from each unit. Question no. one is objective type , compulsory, and covers the whole syllabus. All questions Carry equal marks.

Unit-I Introduction to composition and Improvisation

(a) Meaning and Definition of composition

(b) Origin and development of composition in different time periods - ancient, medieval and Modern period.

(c) Meaning and definition of Improvisation

(d) Principles of Improvisation in classical music.

Unit –II Detail study of tala system in Hindustani and karnatak Music

a) Knowledge of tala Dashpranas and,

b) The original principles of making Tihai,

c) Comparative study of Hindustani and Karnatak tala system with special reference to ten pranas of tala,

d) Detailed study of different layakaris viz, Dugun, Tigun, Chaugun, Ada, Kuada, Viyada and method to apply them in compositions.

Unit-III Research Methodology in Music

a) The methodologies of music research.
b) preparing synopsis, data collection, field work, writing project reports, finding bibliography, reference material etc.
c) Study of interrelation between textual and oral tradition.
d) Review of a Music book

Unit –IV Study of Western Music

Elementary Knowledge of the following

a) Staff Notation
b) Western taal system
c) Harmony
d) Melody

DEPARTMENT OF MUSIC AND DANCE
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MPA Music (Vocal)Semester –X
(W.E.F. 2024-25)

MPAV 543 STAGE PERFORMANCE (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAV 543**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level .**								
	Course Outcomes								
1.	**Enhances Creativity and Systematic improvisation ability among students .**								
2.	**Develops ability to perform Various classical vocal forms**								
3.	**Develops ability to perform semi classical vocal forms .**								
4.	**Enhance knowledge and ability to demonstrate prescribed talas on hands.**								

1. Students are required to prepare any **One** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes including Alap, Taan, boltaan behlava, bol bant Vilambit-Khyal, Drut-Khyal and Tarana are required to be presented.

abhogi kanhra –Nayaki kanhra/Kaunsi kanhra, Miyan malhar– megh malhar

Puriya Dnahashree, Bhimpalasi , Multani

30+10+10=50

2. One Dhrupad or One Dhamar or Sarda along with layakries or Upaj are to be performed in the Ragas prescribed for Practical paper. It is recommended that Pakhawaj Accompaniment may be provided for **Dhrupad** or **Dhamar** singing.

10

5. Ability to demonstrate talas of prescribed syllabus on hands and tabla.

Dhamar , Sool Taal , Chautal 10

MPA Music (Vocal)Semester –X
(W.E.F. 2024-25)

MPAV 544 Viva-Voce & Comparative Study of Ragas(Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAV 544**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Develops confidence to perform as a musically mature and sensible artist .**								
2.	**Ability to differentiate the various ragas and enhance the skills to make notation and improvise ragas with their creativity**								
3.	**Constructs Ability to tune various Instruments .**								
4.	**Enhances ability to compose bandish**								

1.Students are required to prepare atleast 5 ragas with detailed description and complete presentation with Vilambit khyals ,and Drut khyal with bolalaps ,alaps ,tans, boltaans ,taans etc,
20

2. Comparative study of ragas with practical demonstration-cum-viva-voce examination
30

3. Ability to demonstrate the Talas on hands and Tabla as prescribed in syllabus .
10

4. Capacity of Tuning the particular instrument.
10

5. Ability to compose a bandish or composition with lyrics given by examiner in paper in exam. 10

MPA Music (Vocal)Semester –X
(W.E.F. 2024-25)

MPAV 545 PROJECT WORK (Practical)									
Core (Elective) paper	**Code**	**Credits**	**Total Marks**	**External**	**Internal**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAV 545**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
Objects /Purpose	**To enhance the Students' ability to perform and comparatively demonstrate the difference between different Ragas .**								
	Course Outcomes								
1.	**Develops the teaching abilities in students and make them self dependent in various areas i.e. performance , improvisation ,**								
2.	**Enhances the ability to compose and records new musical compositions.**								
3.	**Imparts Knowledge to use Studio tools and others equipment's .**								
4.	**Enhances knowledge about various Recording softwares.**								

1. Student has to prepare one project on following areas ,and has to submit a project report /dissertation in a print form before practical exam . 20+20

Areas for project :

c) Classical
d) Semi Classical Music
(e) Folk and Light Music
(f) Western Music
(g) Devotional Music / Sufi Music/ Shrimad Bhagwad Geeta Shlokas

i. Documentary with printed project report

or

ii. Coverage of musical competition, concerts /event with written report and video cd to be submitted .

2. Self-Composed /arranged Musical Composition or creative work etc. in audio or video form , will be Submitted and Presented by the student in practical exam .

30

3. Musical Arrangement/Programming by the Candidate for Light Music in One Composition.

10

4. Knowledge of Following software

Logic

Department of Music & Dance
Kurukshetra University, Kurukshetra

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2020-21 in Phased manner
1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Sitar) Ist Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAS 113A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAS 113B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (Sitar) IInd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAS 123A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAS 123B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar)
Semester – I
(W.E.F. 2020-21)
MPAS 113A Stage performance (Practical)

	Course Outcomes
1.	**Enhances knowledge about playing of ragas on Sitar.**
2.	**Learned playing sitar with different Alankars.**
3.	**Developed aptitude of Patriotism**
4.	**Capacity to describe and demonstrate taal.**

Paper Code- MPAS113 A
Credits - 4
M.M. 100
(80 External.+20 Internal)
Time- 15-20min/Student

One Vilambit and one Drut Gat with Toras and Jhala in any one Raga from prescribed Syllabus

b) Vrindavani- Sarang b)Bhupali

o) One Drut Gat each raga of syllabus with Toras

p) Five Alankars in Shuddha Swaras

q) Ability to play Vande Mataram on Sitar

r) Ability to Demonstrate Taals on hands with Thah and Dugun Layakaries of Dadra Taal and Rupak Taal.

s) Viva and General Introduction of Ragas.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar) Semester – I
(W.E.F. 2020-21)
MPAS 113B Musicology & General History of Music (Theory)

	Course Outcomes
1.	**Developed Capability to write composition with notation and Knowledge about Ragas.**
2.	**Enhances Knowledge about Taals.**
3.	**Knowledge about different terms of Indian Classical Music.**
4.	**Knowledge about the contribution of great maestros.**

Paper Code- MPAS113 B
Credits – 2
M.M. 50 (40 External.+10 Internal)
Time- 3 Hours

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit –I

A. Historical study and detailed description of the Ragas as given below – Vrindavani Sarang, Bhupali

B. Ability to write the notations of Maseet Khani and Raza Khani Gat of Ragas- Vrindavani Sarang, Bhupali

Unit –II

A. Introduction to Taal

2.1 Taal ,Theka , Taali , Khali,

2.2 Laya and its types Vilambit laya, Madhya laya and Drut laya.

2.3 Detailed description of the following Talas :

Dadra Taal, Rupak Taal

2.4 Ability to write the notation and demonstration on hands with Ekgun and Dugun Layakaries of Dadra Taal, Rupak Taal .

Unit-III

A. Defination of the following terms:

Nad, Shruti, Gat, Jhala, Toda, Raga, Thaat, Vadi, Samvadi, Anuvadi, Vivadi, Meend, Soot, Zamzama, Nayak-Nayaki,

B. Classification of Indian musical Instruments.

Unit-IV

A. Relationship between Folk and Classical Music.

B. Contribution towards music of the following :-

Pt. Ravi Shankar, Ustad Vilayat Khan,

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental- Sitar) Semester – II
(W.E.F. 2020-21)

MPAS 123A Stage performance (Practical)

	Course Outcomes
1.	**Enhances knowledge about Ragas of Indian classical music.**
2.	**Learned playing different Ragas on sitar**
3.	**Developed aptitude of Patriotism and Spirituality**
4.	**Enhances capacity to demonstrate taals.**

Paper Code- MPAS 123A
Credits – 4
M.M. 100 (80 External.+20 Internal)
Time- 15-20min/Student

1. One Vilambit and one Drut Gat with Toras and Jhala in any one Raga of the prescribed Syllabus

   c) Yaman b) Kafi
2. One Drut Gat in each Raga of the syllabus with Toras.
3. Ability to Demonstrate Taals on hands with Thah and Dugun Layakaries of JhapTaal and Teen Taal
4. Five Alankars in Shuddha Swaras.
5. Ability to play Vande Mataram/ Gita Shlok on Sitar.
6. Viva and General Introduction of Ragas of the syllabus.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental – Sitar) Semester – II
(W.E.F. 2020-21)

MPAS 123B Musicology & General History of Music (Theory)

	Course Outcomes
1.	Developed Capability to write composition with notation and Knowledge about Ragas.
2.	Enhances Knowledge about Taals and its different terms.
3.	Knowledge about structural and historical aspects of Sitar.
4.	Knowledge about the contribution of Media in music popularity.

Paper Code- MPAS 123B
Credits - 2
M.M. 50 (40 External+10 Internal)
Time- 3 Hours

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit –I

A. Historical study and detailed description of the Ragas as given below – Yaman, Kafi
B. Ability to write the notations of the Maseet Khani and Raza Khani Gat of above mentioned Ragas.

Unit –II

A. Introduction to the following terms of Taal -
2.1 Aavartan , Sam ,Vibhag, layakari
2.2 Detailed description of the following talas : JhapTaal and Teen Taal
2.3 Ability to write the notation with Ekgun and Dugun Layakaries of Jhap Taal and Teen Taal.

Unit-III

A. Detailed Description of Sitar
B. Time Theory in Indian Music.

Unit-IV

A. Role of Media in the development of Indian Classical Music.
B. Vadkon ke Gun aur Dosh

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SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2021-22
1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Sitar) IIIrd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAS 233A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAS 233B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (Sitar) IVth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAS 243A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAS 243B	Musicology & General History of Music (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar)
(W.E.F. 2021-22)
Semester - III
MPAS 233A Stage performance (Practical)

	Course Outcomes
1.	**Enhances knowledge about playing of ragas on Sitar.**
2.	**Learned playing sitar with different Alankars.**
3.	**Developed aptitude of Patriotism and Spirituality.**
4.	**Capacity to describe and demonstrate taal.**

Paper Code- MPAS 233 A
Credits - 4
M.M. 100 (80 External+20 Internal)
Time- 15-20min/ Student

1. One Vilambit and one Drut Gat with Toras and Jhala in any one Raga of the prescribed Syllabus.

   Bhairav, Bhairavi, Jaijaiwanti

2. One Drut Gat in each raga of the syllabus with Toras

3. Five Alankars in Vikrit Swaras.
4. Ability to play National Anthem / Gita Shlok on Sitar.
5. Ability to Demonstrate Taals on hands in Thah and Dugun layakaries of Ek Taal, Tivra and Tilwara.
6. Viva and General Introduction of the Ragas of the prescribed Syllabus.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar) Semester – III
(W.E.F. 2021-22)
MPAS 233B Musicology & General History of Music (Theory)

	Course Outcomes
1.	**Enhances Knowledge about Taals and Ragas.**
2.	**Developed Capability to write composition with notation and Knowledge about Ragas.**
3.	**Knowledge of tuning of Sitar.**
4.	**Knowledge about the contribution of great maestros.**

Paper Code- MPAS 233 B
Credits - 2
M.M. 50 (40 External+10 Internal)
Time- 3 Hours

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit –I

A. Historical study and detailed description of the Ragas prescribed in the syllabus.
   Ragas : Bhairav, Bhairvi and Jaijaiwanti
B. Ability to write the notation of the following Taalas in Ekgun, Dugun and Chaugun Layakaries- Ek Taal, Tilwara and Tivra.

Unit –II

A. Ability to write the notation of Maseet Khani and Raza Khani gats in the ragas prescribed in the syllabus.
B. Short Notes on the following terms:
   Alpatva-Bahutva, Gat, Maseet Khani Gat, Raza Khani Gat, Amir Khani Gat and Avirbhav-Tirobhava.

Unit-III

A. History of Music in medieval period.
B. Methods of tuning of Sitar.

Unit-IV

A. Contribution towards Music of the following:

1. Abdul Halim Zafar Khan 2. Allauddin Khan

B. Different styles of Sitar-Vadan.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar) Semester – IV
(W.E.F. 2021-22)
MPAS 243A Stage performance (Practical)

	Course Outcomes
1.	**Enhances knowledge about playing of ragas on Sitar.**
2.	**Learned playing sitar with different Alankars.**
3.	**Developed aptitude of Patriotism and Spirituality.**
4.	**Capacity to describe and demonstrate taal.**

Paper Code- MPAS 243 A
Credits - 4
M.M. 100 (80 External+20 Internal)
Time- 15-20 min/Student

1. One Vilambit and one Drut Gat with Toras and Jhala in any one Raga of your choice from -

   Malkauns, Khamaj, Shuddh -Kalyan

2. One Drut Gat in each Raga of prescribed syllabus with Toras.

3. Five Alankars in Vikrit Swaras.

4. Ability to play National Anthem / Gita Shlok on Sitar.
5. Ability to Demonstrate Taals on hands in Thah and Dugun layakaries of Kahrva Taal and Deepchandi Taal.
6. Viva and General Introduction of the Ragas of your prescribed Syllabus.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar) Semester – IV
(W.E.F. 2021-22)
MPAS 243B Musicology & General History of Music (Theory)

	Course Outcomes
1.	**Enhances Knowledge about Ragas and Taals.**
2.	**Developed Capability to write composition with notation and Knowledge about different terms of classical music.**
3.	**Knowledge of history of music.**
4.	**Knowledge about the contribution of science and knowledge of other musical instruments.**

Paper Code- MPAS 243 B
Credits - 2
M.M. 50 (40 External+10 Internal)
Time- 3 Hours

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit –I

A. Historical study and detailed description of the Ragas prescribed in the syllabus.
   Malkauns, Khamaj and Shudh-Kalyan
B. Ability to write the notation of the following Taalas in Ekgun and Dugun Layakaries : Deepchandi, Kahrva Taal.

Unit –II

A. Ability to write the notation of Maseet Khani and Raza Khani gats in the ragas as prescribed in the syllabus.
B. Short Notes on the following terms:
   Parmel –Praveshak -Raag, Sandhi –Pakash- Raagas, Gram, Murchhana and Lakshan Geet

Unit-III

A. History of Indian Classical Music from vedic period to 12th century.

B. Write about Swayambhu Naad in detail.

Unit-IV

A. Contribution towards Music of the following:
Ustad Inayat Khan, Pt. Nikhil Bainarjee

B. Role of Science in promoting the Educational and Cultural aspects of Music during modern period.

C. Detailed description of the following Instruments :
Sarod, Violin, Guitar and Santoor

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SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2022-23
1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. (Sitar) Vth Semester
Discipline Specific course (DSC)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific course (DSC)	MPAS 353A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAS 353B	Musicology & General History of Music(Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (Sitar) VIth Semester
Discipline Specific course (DSC)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific course (DSC)	MPAS 363A	Stage performance (Practical)	0+0+8	4	15-20 min/ student		80	20	100
	MPAS 363B	Musicology & General History of Music(Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar)
(W.E.F 2022-23)
Semester – V
MPAS 353A Stage performance (Practical)

	Course Outcomes
1.	**Enhances knowledge about playing of ragas on Sitar.**
2.	**Learned playing Harmonium with different Alankars.**
3.	**Developed aptitude of Patriotism and Spirituality.**
4.	**Capacity to describe and demonstrate taal.**

Discipline Specific Course (DSC) **Paper Code –MPAS 353A**
Credit-4 **M.M. 100 (80 External+20 Internal)**
Time- 15-20min/Student

1. One Vilambit and one Drut Gat with Toras and Jhala in any one Raga of your choice from

   Todi, Puriya-Dhanashri, Bihag and Bhimplasi
2. One Drut Gat in each raga of the syllabus with Toras
3. Sing five Alankars in Shudha Swaras with Harmonium.
4. Ability to play “Sare Jahan se Achha” / Gita Shlok on Sitar
5. Ability to Demonstrate Taals on hands with Thah and Dugun Layakaries of Sul Taal, Dhamar Taal.
6. Viva and General Introduction of the Ragas of the prescribed Syllabus.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar)
(W.E.F 2022-23)
Semester –V
MPAS 353B Musicology & General History of Music (Theory)

	Course Outcomes
1.	Enhances Knowledge about Taals and Ragas.
2.	Developed Capability to write composition with notation and Knowledge about other instruments.
3.	Knowledge about notation system.
4.	Knowledge about the contribution of great maestros.

Discipline Specific Course (DSC) **Paper Code –MPAS 353B**
Credit-2 **M.M. 50 (40 External+10 Internal)**
Time- 3Hours

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit –I

A. Historical study and detailed description of the Ragas prescribed in the syllabus.
Todi, Puriya- Dhanashri, Bihag, Bhimplasi

B. Ability to write the notation of the following Taalas with Ekgun and Dugun Layakaries: Sul Taal and Dhamar Taal.

Unit –II

A. Ability to write the notation of Maseetkhani and Razakhani gats of the ragas as prescribed in the syllabus.

B. Write in detail about the origin and development of Indian Orchestra.

Unit-III

A. Give a detailed description of the Notation System with its merits and demerit.

B. Give your suggestions for popularizing the Classical Music in the society.

Unit-IV

Contribution towards Music of the following:

A. Ustad Mushtaq Ali Khan
B. Pt. Debu Chaudhary

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar)
(W.E.F 2022-23)
Semester – VI

MPAS 363A Stage performance (Practical)

	Course Outcomes
1.	**Enhances knowledge about playing of ragas on Sitar.**
2.	**Learned playing Harmonium with different Alankars.**
3.	**Developed aptitude of Patriotism and Spirituality.**
4.	**Capacity to describe and demonstrate taal.**

Discipline Specific Course (DSC) **Paper Code –MPAS 363A**
Credit-4 **M.M. 100 (80 External+20 Internal)**
Time- 15-20min/Student

1. One Vilambit and one Drut Gat with Toras and Jhala in any one Raga of your choiceof the prescribed Syllabus-
   Miyan ki Malhar, Deshkar, Kamod and Bahar
2. One Drut Gat in each raga of the syllabus with Toras
3. Sing five Alankars in Vikrit Swaras with Harmonium
4. Ability to Demonstrate Taals on hands in Thah and Dugun Layakaries of Ada-Chautaal, Dhamar Taal.
5. Ability to play “Aye mere watan ke logo” / Gita Shlok on Sitar
6. Viva and General Introduction of ragas of the prescribed Syllabus.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Instrumental - Sitar)
(W.E.F 2022-23)
Semester – VI
MPAS 363B Musicology & General History of Music (Theory)

	Course Outcomes
1.	Enhances Knowledge about Ragas and Taals.
2.	Developed Capability to write composition with notation and Knowledge about music history.
3.	Knowledge about new aspects of international cultural exchange.
4.	Knowledge about the Raag Vargikaran and contribution of great maestros.

Discipline Specific Course (DSC) **Paper Code –MPAS 363B**
Credit-2 **M.M. 50 (40 External+10 Internal)**
Time- 3Hours

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit –I

A. Historical study and detailed description of the Ragas prescribed in the syllabus.
Miyan ki Malhar, Deshkar, Kamod and Bahar

B. Ability to write the notation of the following Taalas with Ekgun, Dugun, Tigun and Chaugun Layakaries: Dhamar Taal, Ada-Chautaal.

Unit –II

A. Ability to write the notation of MaseetKhani and RazaKhani gats in the ragas as prescribed in the syllabus.

B. Write in detail about the development of Indian Classical Music during 17^{th} century.

Unit-III

A. Give a detailed description of Harmony and Melody.

B. Write in detail about the role of music in International Cultural Exchange.

Unit-IV

A. Give a detailed description of Raag-Ragini Vargikaran.

B. Contribution towards Music of the following:

C. Ustad Ali Akbar Khan, Ustad Shahid Parvez

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2023-24
1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit
MPA (Sitar) Semester VIIth

Papers Category	**Code**	**Nomenclature**	**L+T+P**	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MPAS 411	History of Indian Music & Musicology	4+0+0	4	3 Hours	80		20	100
Core-2	MPAS 412	Principle and Techniques of Stage Performance, & Recording Studio Work and maintenance of musical instruments	4+0+0	4	3 Hours	80		20	100
Core-3	MPAS 413	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAS 414	Viva-Voce, Comparative Study of the Ragas And Basic Knowledge of Singing & Playing Other Instruments.	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MPAS 415	Project Work (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

MPA (Sitar) Semester VIIIth

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAS 421	History of Indian Music & Musicology	4+0+0	4	3 Hours	80		20	100
Core-2	MPAS 422	Principle and Techniques of Stage Performance, & Recording Studio Work and maintenance of musical instruments	4+0+0	4	3 Hours	80		20	100
Core-3	MPAS 423	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAS 424	Viva-Voce, Comparative Study of the Ragas And Basic Knowledge of Singing & Playing Other Instruments.	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MPAS 425	Project Work (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Open Elective	OEM-I	General History and Basics of Indian Music -I (Theory)	2+0+0	2	3 Hours	40		10	50
Total						20	400	100	500

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
MPA (Sitar) Semester -VII
(W.E.F. 2023-24)
Paper-1

MPAS 411 History of Indian Music & Musicology (Theory)

Credits – 4 **Paper code- MPAS 411**
Time: 3 hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Logical deep knowledge regarding different Raagas.**
2.	**Develop Capability to write composition with notation.**
3.	**Develop capacity of knowing different layakaries in practical methods.**
4.	**Enhances knowledge about Vedic history of Indian Music.**

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit -I (i) A critical and comparative study of the following Ragas:-
Shyam-Kalyan and Puriya-Kalyan, Devgiri-Bilawal andYamani-Bilawal, Malkauns and Chandrakauns.

(ii) Theoretical study of the following Ragas:-
Yaman, Alhaiya-Bilawal, Bhairava.

Unit –II Notation of Vilambit & Drut Gats of the Ragas prescribed in the syllabus along-with a few Aalap and Toras with a capacity to write the Notation in Pt. Bhatkhande or Pt. Vishnu Digambar Notation System.

Unit –III A study of the following Talas and ability to Write them in Ekgun, Dugun,Tigun & Chaugun Laykaries :- Teen-Taal, Rupak, Deepchandi and Rudra taal.

Unit-IV (i) History of Indian Classical Music from Vedic period to13th Century.

(ii) Nature, concept and classification of Jaati-Gayan as prescribed by Bharat, Matang and Sharangdeva.

(iii) Study of Ten essentials of Ragas as described in the ancient text and their application to Medieval and Modern musical system.

(iv) Contribution to Indian Classical Music of following Music Scholars:-
Bharat, Dattil, Matang and Pt. Sharangdeva

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.P.A (Sitar) Semester –VII

(W.E.F. 2023-24)

Paper-II

MPAS 412 Principle and Techniques of Stage Performance, & Recording Studio Work and maintenance of musical instruments (Theory)

Credits – 4 **Paper code- MPAS 412**
Time: 3 hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	Enhances the knowledge about various principles of stage performance.
2.	Develop Capability to understand studio equipments.
3.	Develop capacity of knowing electronic media in Indian classical music.
4.	Enhances the knowledge about different methods in different Gharanas.

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Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit-1

(a) Preparation for Presenting the Stage Programme by the Artist.

(b). Division of Time of the presenting programme.

(c). Selection of Item according to Occasion, Season and Time.

(b) Psychology of Audience and its Relationship with the Artist.

Unit-II

(a) Definition of Recording.

(b) Origin and development of recording system.

(c) Importance of Recording place (Open & Studio)

Unit-III

(a) Importance of Radio in Popularizing the Indian Music.

(b) Importance of Television in Popularizing the Indian Music.

Unit-IV a) Methods of Tunning, Minor Repairing & Structural knowledge of the following Instruments

(i) Sitar

(ii) Tanpura.

b) Teaching of Music in Gharanas.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.P.A (Sitar) Semester –VII

(W.E.F. 2023-24)
Paper-III

MPAS 413 Stage Performance (Practical)

Credits – 4 **Paper code- MPAS 413**
Time: 30-35 min/ Student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation of different ragas in traditional way.**
2.	**Enhances knowledge of Folk Music though various dhuns.**
3.	**Develop skills of singing with chords on Harmonium.**
4.	**Enhances knowledge about different singing compositions of Music with Harmonium.**

1. Candidates are required to prepare any **One** Raga from the ragas of Prescribed syllabus of his/her choice and perform it for not less than 30 minutes including Aalap, Jod, Jod-Taan, Jod-Jhala, Maseetkhani Gat and Razakhani Gat with toras and jhala are required to be presented. 30

2. One Gat in a Tala **other than Teen Taal** alongwith the layakries to be performed in the Ragas prescribed for Practical paper. 15

3. Two **Dhuns** may be prepared in any Raga.
10+10=20
One should be in folk music.

4. Basic Knowledge of **Chords** on Harmonium. 05

5. Sing any of the following with Harmonium 10
Geet, Ghazal or Devotional Song

M.P.A (Sitar) Semester –VII
(W.E.F. 2023-24)
Paper-IV
MPAS 414 Viva-Voce, Comparative Study of the Ragas And Basic Knowledge of Singing & Playing Other Instruments (Practical)

Credits – 4 **Paper code- MPAS 414**
Time: 30-35 min/ Student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances deep knowledge about different ragas.**
2.	**Enhances knowledge about tuning the instrument.**
3.	**Develop skills of singing different types of Alankars with Harmonium.**
4.	**Enhances knowledge about different swaras and scales of Music with Harmonium.**

1. Basic Knowledge & Introduction of the Ragas of prescribed syllabus with their comparative and practical demonstration-cum-viva-voce examination will be held. 15+15 = 30

2. Basic Knowledge of Playing Talas as prescribed in syllabus on hand. 20

3. Capacity of Tunning of your Particular Instrument. 10

4. Capacity of Playing **Ten** Alankaras on Harmonium. 10

5. Basic Knowledge of Singing Shuddhas-VikritaSwaras of a Saptak with at least **Five** Basic Alankaras of Shuddha- Swar-Saptaka. 10

M.P.A (Sitar) Semester –VII

(W.E.F. 2023-24)

Paper-V

MPAS 415 Project Work (Practical)

Credits – 4 **Paper code- MPAS 415**

Time: 30-35 min/ Student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge about programming of musical compositions.**
2.	**Develop practical knowledge of recording studio and software.**
3.	**Develop skills to prepare documentary with Movie Maker software and basic recorder.**
4.	**Enhances knowledge about converting video file to mp3 file.**

1. Musical Arrangement/Programming by the Candidate for Light Music in One Composition. 30
2. Practical Knowledge of Recording-Studio and Software etc. by the Candidate. 10+10=20
   (a) Movie Maker
   (b) Sound Forge
   (c) Audacity
   (d) Studio Software (Video Editing) etc.
3. A documentary with the help of Movie Maker and Basic Recorder and Editing tools. 20
4. How to change a Video File to mp3 or mp4 File. 10

Music (Sitar) Semester-VIII

(W.E.F. 2023-24)
Paper-I
MPAS 421History of Indian Music & Musicology (Theory)

Credits – 4 **Paper code- MPAS 421**
Time: 3 hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	Enhances Logical deep practical and theoretical knowledge of different raagas.
2.	Develop capability to write composition with notation.
3.	Develop capacity of knowing different layakaries of different taals.
4.	Enhances knowledge about the musical instruments of Indian Music and there Gharanas.

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit -I (i) A critical and comparative study of the following Ragas:-
Ahir-Bhairava and Nata-Bhairava,Bageshwari and Rageshwari, Shudda-Sarang and Vrindavani-Sarang.

(ii) Theoretical study of the following Ragas:-
Kafi, Bihag, Marwa and Puriya.

Unit –II Notation of Vilambit&DrutGatas of the Ragas prescribed in the syllabus along-with a few Aalap and Toras with a capacity to write the Notation in Pt.Bhatkhande or Pt. Vishnu Digambar Notation System.

Unit –III A study of the following Talas and ability to Write them in Ekgun, Dugun,Tigun&ChaugunLaykaries :-Ek-Taal, Jhap-Taal&Kaharwa.

Unit-IV (i) Clasification of Indian Musical Instruments.

(ii) Historical Knowledge of the following Musical Instruments:-

Veena, Sitar, Taanpura, Vanshi, Pakhawaj, Tabla, Kartal and Manjira.

(iii) Study of different Gharanas of Khayal, Sitar &Tabla.

Music (Instrumental- Sitar) Semester-VIII
(W.E.F. 2023-24)
Paper-II (Theory)
MPAS 422 Principle and Techniques of Stage Performance of Recording Studio Work and Maintenance of musical instruments (Theory)

Credits – 4 **Paper code- MPAS 422**
Time: 3 Hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	Enhances the knowledge about various principles of stage performance.
2.	Developed Capability to understand studio recording techniques.
3.	Developed capacity of knowing electronic and print media in Indian classical music.
4.	Enhances the knowledge about tuning and teaching methods in different institutes.

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit-1 Basic Principles of Stage Performance

(a) Assessment of total Impact of the Performance by the Organizer.

(b) Role of Accompanying Artistes in the Stage Performance.

Unit-II Principles & Techniques of Recording

(a) Detailed description of Modern Studio.

(b) Description of L.P. Recording, Tape cassettes, CD/D.V.D, Micro Chip .

Unit-III Music and Media

(a) Importance of Computer & Internet for Music.

(b) Importance of Print Media.

Unit-IV Methods of Tunning, Minor Repairing & Structural knowledge of the following Instruments.

(a) Pakhawaj, Tabla and Dholak..

Teaching System.

(a)Teaching of Music in Sangeet Vidyalyas, Mahavidyalyas and Vishwavidyalyas.

MPA (Sitar) Semester-VIII
(W.E.F. 2023-24)
Paper-III
MPAS 423 Stage Performance (Practical)

Credits – 4 **Paper code- MPAS 423**
Time: 30-35 min/ Student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation of different ragas in traditional way.**
2.	**Enhances knowledge of Folk Music though various dhuns.**
3.	**Develop skills of playing different musical instruments.**
4.	**Enhances knowledge about playing raag based film song on Sitar.**

1 Candidates are required to prepare any **One** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes including Aalap, Jod, Jod-Taan, Jod-Jhala, Maseetkhani Gat, Razakhani Gat and Thumri are required to be presented. 40

2. One Gata in a Tala **other than "Teen Taal"** along with the layakries to be performed in the Ragas prescribed for Practical paper. 15

3. Two **Dhuns** may be prepared in any Raga. 20

4. Basic Knowledge of Playing other Instruments like Patti-Tarang/Santoor/Dilruba etc. 05

5. Playing of Two Raga-Based Film Songs on your Particular Instrument. 10

Music (Sitar) Semester-VIII
(W.E.F. 2023-24)
Paper-IV

MPAS 424 Viva-Voce, Comparative Study of the Ragas and Basic Knowledge of Singing & Playing Other Instruments (Practical)

Credits – 4 **Paper code- MPAS 424**
Time: 30-35 min/ Student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances deep knowledge about different ragas.**
2.	**Enhances knowledge about playing taals on Tabla.**
3.	**Developed skills of playing different types of Alankars with Harmonium.**
4.	**Enhances knowledge about singing of different Alankars.**

1. Basic Knowledge & Introduction of the Ragas of prescribed syllabus with their comparative and practical demonstration-cum-viva-voce examination will be held. 15+15 = 30

2. Basic Knowledge of Playing Talas as prescribed in syllabus on Tabla . 20

3. Capacity of Minor Repairing of Particular Instrument. 10

4. Capacity of Playing **Ten** Alankaras on Harmonium. 10

5. Basic Knowledge of Singing Shuddhas-Vikrita Swaras of a Saptak with at Least **Five** Basic Alankaras of Shuddha- Swar-Saptaka. 10

MPA (SITAR) Semester- VIII

Paper-V

(W.E.F. 2023-24)

MPAS 425 Project Work (Practical)

Credits – 4 **Paper code- MPAS 425**

Time: 30-35 min/ Student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge about arranging of musical compositions.**
2.	**Developed practical knowledge of recording studio and software.**
3.	**Developed skills to prepare documentary with Movie Maker software and basic recorder.**
4.	**Developed writing skills in particular topic.**

1. Musical Composition etc will be presented/Submitted by the Candidate his/her self in an Audio C.D/ Cassettes etc. 30

2. Practical Knowledge of Recording-Studio and Software etc. by the Candidate. 20

(e) Movie Maker

(f) Sound Forge

(g) Audacity

(h) Studio Software (Video Editing) etc.

3. Minor Project on the topic given by the teacher. 30

- Documentary (Photos and Music)
- Report of a Musical Festival
- Any practical aspect given by the teacher.
- Any theoretical topic with some new area and idea.

Department of Music & Dance
Kurukshetra University, Kurukshetra

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2024-25

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

MPA (Sitar) Semester IXth

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAS 531	History of Indian Music & Musicology	4+0+0	4	3 Hours	80		20	100
Core-2	MPAS 532	Principle and Techniques of Stage Performance, & Recording Studio Work and maintenance of musical instruments	4+0+0	4	3 Hours	80		20	100
Core-3	MPAS 533	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAS 534	Viva-Voce, Comparative Study of the Ragas And Basic Knowledge of Singing & Playing Other Instruments.	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MPAS 535	Project Work (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Open Elective	OEM-II	General History and Basics of Indian Music –II (Theory)	2+0+0	2	3 Hours	40		10	50
Total						20	400	100	500

MPA (Sitar) Semester Xth

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAS 541	History of Indian Music & Musicology	4+0+0	4	3 Hours	80		20	100
Core-2	MPAS 542	Principle and Techniques of Stage Performance, & Recording Studio Work and maintenance of musical instruments	4+0+0	4	3 Hours	80		20	100
Core-3	MPAS 543	Stage performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAS 544	Viva-Voce, Comparative Study of the Ragas And Basic Knowledge of Singing & Playing Other Instruments)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective-5	MPAS 545	Project Work (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

M.P.A. Semester-IX
Music Instrumental (Sitar)
Syllabus and Course of Reading (W.E.F. 2024-25)
Paper-I
MPAS 531 History of Indian Music & Musicology (Theory)

Credits – 4 **Paper code- MPAS 531**
Time: 3 hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Logical deep knowledge regarding different raagas.**
2.	**Developed Capability to write composition with notation.**
3.	**Developed capacity of knowing different layakaries in practical methods.**
4.	**Enhances knowledge about history of Indian Music and contribution of music scholars maestros.**

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit -I (i) A critical and comparative study of the following Ragas:- Maru- Bihag—Nat -Bihag, Bilaskhani-Todi—Miyan ki Todi, Miyan Malhar—Bahar

(ii) Theoretical study of the following Ragas:- Bhupali, Darbari, Shuddh-Sarang, Kirwani.

Unit –II Notation of Vilambit & Drut Gatas of the Ragas prescribed in the syllabus along-with a few Aalap and Toras with a capacity to write the Notation in Pt.Bhatkhande or Pt. Vishnu Digambar Notation System.

Unit –III A study of the following Talas and ability to Write them in Ekgun, Dugun,Tigun & Chaugun Laykaries :- Dhamar, Sool-Taal, Chautal.

Unit-IV (i) History of Indian Classical Music from 13th to 20th century.

(ii) Principles of Orchestration and its possibilities and desirablities in Indian Music at present time.

(iii) A study of the followings:- Aalapti, Sathya, Giti, Kaku, Kutup, Gamak and Jaties of the Ragas.

(iv) Contribution to Indian Classical Music of following Musicians: Pt. Ahobal, Srinivas, Vynkatmukhi, Omkarnath Thakur, Ustad Rajab Ali Khan & Ustad Bismillah Khan..

MPA (Sitar)Semester-IX
(W.E.F. 2024-25)
Paper-II
MPAS 532 Principle and Techniques of stage performance & Recording Studio works and maintenance of musical instruments (Theory)

Credits – 4 **Paper code- MPAS 532**
Time: 3 Hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances the knowledge about principles of stage performance.**
2.	**Developed skill to perform studio recording.**
3.	**Developed capacity of tuning different Indian classical musical instruments.**
4.	**Enhances the knowledge about different methods in different institutions.**

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit-1 Basic Principle of Stage performance and Music Method 15+15=30

(a) Assessment of total Impact of the performance by the Organizer.

(b) Importance of Computer & Internet for Music.

Unit-2 Principles & Techniques of Recording (Audio/Video) 10+10=20

(a) Detailed description of Modem Studio.

(b) Description of L.P Recording, Tape, Cassettes.

Unit-3 Methods of tuning, Minor Repairing and Structural Knowledge of the following Instruments 10+10=20

(a) Saarangi, Swar-Mandal, Guitar

(b) Mridang, Nagara, Khol, and Naal.

Unit-4 Modern teaching System of Indian Music 10+10=20

- Teaching of Music in Sangeet Vidyalyas, Mahavidyalyas.

MPA (Sitar) Semester-IX
(W.E.F. 2024-25)
Paper-III
MPAS 533 Stage Performance (Practical)

Credits – 4 **Paper code- MPAS 533**

Time: 30-35min/student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation of different ragas.**
2.	**Enhances knowledge of other Musical forms with different taals.**
3.	**Developed skills of singing with chords on Harmonium.**
4.	**Enhances knowledge about different singing compositions of Music with Harmonium.**

1 Candidates are required to prepare any **Two** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes each raga including Aalap, Jod, Jod-Taan, Jod-Jhala, Maseetkhani Gat, Razakhani Gat and Jhala are required to be presented.

20+20= 40

2. Two Gatas in two different Talas **other than "Teen Taal"** alongwith the layakries to be performed in the Ragas prescribed for Practical paper.

10+10=20

3. Two **Dhuns** may be prepared in any Raga of the prescribed syllabus. 10+10=20

4. Basic Knowledge of **Chords** on Harmonium. 10

MPA (Sitar) Semester-IX
(W.E.F. 2024-25)
Paper-IV

MPAS 534 Viva-Voce, Comparative Study of the Ragas and Basic Knowledge of Singing & Playing Other Instruments (Practical)

Credits – 4 **Paper code- MPAS 534**
Time: 30-35min/ student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation of different ragas.**
2.	**Enhances knowledge of other Musical forms with different taals.**
3.	**Developed skills of tuning of Sitar and other musical instruments.**
4.	**Enhances knowledge about singing compositions of Music with Harmonium.**

1 Basic Knowledge & Introduction of the Ragas of prescribed syllabus with their comparative and practical demonstration-cum-viva-voce examination will be held.

15+15 = 30

2. Basic Knowledge of Playing Talas as prescribed in syllabus on hand . 20

3. Capacity of comparative Tuning between Particular Instrument and other string instrument. 20

4. (a) Capacity of Playing one folk song of any type with complete presentation him/herself. 10+10

(b) Basic Knowledge of Singing Drut Khyal with at least two basic tanas with playing the Harmonium/Tanpura/Swar-Mandal etc.

MPA (Sitar) Semester – IXth

(W.E.F. 2024-25)

Paper-V

MPAS 535 Project Work (Practical)

Credits – 4 **Paper code- MPAS 535**

Time: 30-35min/ student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation/composition in studio with new ideas.**
2.	**Enhances knowledge of other Light Musical compositions with music arrangement.**
3.	**Developed skills about the working recording studio softwares.**
4.	**Enhances knowledge about preparing a documentary of a musical festival.**

1. Two different Musical Compositions etc will be Presented/Submitted by the Candidate his/her-self in one Audio and one Video C.D./Cassettes etc. 20
2. Musical Arrangement/Programming by the Candidate for Light Music in Two Compositions. 10+10=20
3. Practical Knowledge of Recording-Studio and Software etc by the Candidate. 15+15=30

   (a). Sound Forge. (b). Nuendo.
4. Minior Project on different topics given by the teacher. 30
   - Documentary.
   - Report of Musical Festival (Sur-Tarang, Ratnawali etc.)
   - Any practical aspect given by the teacher.
   - Any Theoretical topic with some new ideas and area.

MPA (Sitar) Semester-X
(W.E.F. 2024-25)
Paper-I
MPAS 541 History of Indian Music & Musicology(Theory)

Credits – 4 **Paper code- MPAS 541**
Time: 3 hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Logical deep knowledge regarding different raagas.**
2.	**Developed Capability to write composition with notation.**
3.	**Developed capacity of knowing different layakaries in practical methods.**
4.	**Enhances knowledge about different musical compositions, musical instruments and Gharanas.**

Note:- There shall be nine questions in all. The candidate shall be required to attempt five questions in all, selecting one question from each unit. Question number (1) one must be objective type, compulsory and will cover whole syllabus. All questions carry equal marks.

Unit -I (i) A critical and comparative study of the following Ragas:- Malkauns—Chandrakauns, Abhogi-Kanhra—Nayaki-Kanhra, Bageshree—Rageshree.

(ii) Theoretical study of the following Ragas:- Multani, Madhu-Kauns, Puriya –Dhanshree, Shivranjani.

Unit –II Notation of Vilambit & Drut Gatas of the Ragas prescribed in the syllabus along-with a few Aalap and Toras with a capacity to write the Notation in Pt.Bhatkhande or Pt. Vishnu Digambar Notation System.

Unit –III A study of the following Talas and ability to Write them in Ekgun, Dugun,Tigun & Chaugun Laykaries : Ada-Chautal, Tilwarha, Tivra Taal.

Unit-IV (i) Folk Tunes of different States – Garbha, Raas, Kajri, Chaiti, Jhumar.

(ii) Historical Knowledge of the following Musical Instruments:-Rudra –Veena, Santoor, Violin, Shehnai, Mridang, Jhunjuna and Ghungroo.

(iii) Study of different Gharanas related to Dhrupad, Sarangi, Mridang(Pakhawaj) and Dance(Katthak).

(iv) Comparative study of Hindustani and Karnatiki Music with special reference to Swar, Taal, Mela , Raga and Vocal and Instrumental Forms.

MPA (Sitar) Semester-X
(W.E.F. 2024-25)
Paper-II

MPAS 542 Principle and Techniques of stage performance & Recording Studio works and maintenance of musical instruments (Theory)

Credits – 4 **Paper code- MPAS 542**
Time: 3 hours **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances the knowledge about principles of stage performance.**
2.	**Developed skill to perform studio recording and knowledge about studio equipments.**
3.	**Developed capacity of tuning different Indian classical musical instruments.**
4.	**Enhances the knowledge about different methods in different institutions.**

Unit-1 Basic Principles of Stage performance, Music and Media. 15+15=30
(a) Relationship between Performer and accompanists.
(b) Importance of print Media for Music (Books, Newspepers, Magazinesm Journals etc.

Unit- 2 Principles & Techniques of Recording 10+10=20
(a) Description of CD/DVD, Micro Chip etc.
(b) Sound Production & Use of Micro Phones

Unit-3 Methods of Tunning, Minor Repairing & Structural Knowledge of the following Instruments. 10+10=20
(a) Shehnai, Shankh and Calarnet.
(b) Steel-Tarang, Kasth-Tarang, Ghanta-Ghanti, Jai Ghanta, Jhanjh and Chimta.

Unit-4 Modern teaching syssssstem of Indian Classical Music 10+10=20
(a) Teaching of Music in other Vidyalas, Mahavidyalas and Vishwavidyalas.

MPA (Sitar) Semester-X

(W.E.F. 2024-25)

Paper-III

MPAS 543 Stage Performance (Practical)

Credits – 4 **Paper code- MPAS 543**

Time: 30-35min/ student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation of different ragas.**
2.	**Enhances knowledge of other Musical forms with different taals.**
3.	**Developed skills of playing dhun on Sitar and other musical instruments.**
4.	**Enhances knowledge about different singing compositions of Music with Guitar.**

1 Candidates are required to prepare any **Two** Raga from the ragas of prescribed syllabus of his/her choice and perform it for not less than 30 minutes each raga including Aalap, Jod, Jod-Taan, Jod-Jhala, Maseetkhani Gat, Razakhani Gat and Jhala are required to be presented.

20+20= 40

2. Two Gatas in two different Talas **other than "Teen Taal"** alongwith the layakries to be performed in the Ragas prescribed for Practical paper.

10+10=20

3. Two **Dhuns** may be prepared in any Raga of the prescribed syllabus.

10+10=20

4. Basic Knowledge of **Chords** on Guitar. 10

MPA (Sitar) Semester-X
(W.E.F. 2024-25)
Paper-IV
MPAS 544 Viva-Voce, Comparative Study of the Ragas and Basic Knowledge of Singing & Playing Other Instruments (Practical)

Credits – 4 **Paper code- MPAS 544**
Time: 30-35min/ student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation of different ragas.**
2.	**Enhances knowledge of playing talas on Tabla.**
3.	**Developed skills of minor reparing of Sitar and other string instruments.**
4.	**Enhances knowledge about singing compositions of Music with Harmonium or tanpura.**

1 Basic Knowledge & Introduction of the Ragas of prescribed syllabus with their comparative and practical demonstration-cum-viva-voce examination will be held. 15+15 = 30

2. Basic Knowledge of Playing Talas as prescribed in syllabus on Tabla . 20

3. Capacity of comparative Minor Repairing between Particular Instrument and other string instrument. 20

4. (a) Capacity of singing one folk song of any type with complete presentation him/herself.. 10

(b) Basic Knowledge of Singing Bhajan etc with at least two basic tans with playing the Harmonium/Tanpura/Swar-Mandal etc. 10

MPA (Sitar) Semester-X
(W.E.F. 2024-25)
Paper-V
MPAS 545 Project Work (Practical)

Credits – 4 **Paper code- MPAS 545**
Time: 30-35min/ student **M.M -100 (80 External+ 20 Internal)**

	Course Outcomes
1.	**Enhances knowledge to prepare presentation/composition in studio with new ideas.**
2.	**Enhances knowledge of other Light Musical compositions with music arrangement.**
3.	**Developed skills about the working recording studio softwares.**
4.	**Enhances knowledge about preparing a documentary of a musical festival.**

1. Two different Musical Compositions etc. will be presented/submitted by the candidate his/her-self in one Audio and one Video. 20
2. Musical Arrangement Programming by the Candidate for Light music in One Compositors 20
3. Practical Knowledge of Recording Studio and Studio and Software etc. by the Candidate.

   15+15=30

   (a) Sound Forge
   (b) Nuendo
   (c) Cubase
4. Minor Project on the topic given by the teacher. 20
   - Documentary (Photos and Music)
   - Report of a Musical Festival (Sur-Tarang, Ratnawali etc.)
   - Any practical aspect given by the teacher.
   - Any theoretical topic with some new area and idea.

Department of Music & Dance
Kurukshetra University, Kurukshetra
M.P.A. Music Tabla
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks ,1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. Music Tabla Ist Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAT 115A	Stage performance (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAT 115B	General History of Music & Musicology (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. Music Tabla IInd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAT 125A	Stage performance (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAT 125B	Basic introduction of Tabla & Musicology (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (TABLA) SEMESTER –I
Syllabus and Course of Reading
(W.E.F 2020-21)

Core Elective

MPAT 115A STAGE PERFORMANCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 115A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Knowledge of basic structure of tabla and fingers used for tabla playing.**								
2.	**To Recognize basic syllables of tabla and ability to play theka of taal.**								
3.	**Capacity to play variations of taal and showing Thah, Dugun of taal on hand.**								
4.	**Demonstration of tabla solo in Teentaal.**								

Section-1

A) Introduction of the parts of Tabla.

B) Knowledge of classical names of fingers and their usage.

Section-2

A) Practical knowledge of the basic syllables of Tabla (Dahina and Bayan) like:

NA, GE, DHA, DHIN, DIN, GHE, TE, TE etc.

B) Ability to play THEKA of Teentaal and Dadra taal with proper Nikas and Sound

Section-3

A) Ability to play Theka and its variations in Thah and Dugun : Keharwa and Dadra.

B) Practice of Theka recitation of Teentaal on hand.

Section-4

A) Ability to play one kayada with four Paltas based on syllable TETE in Teentaal.

B) Ability to understand the SAM and KHALI with NAGMA/LAHRA.

C) Presentation of Teentaal with one Kayda four Paltas , Tihaai, and two Tukdas.

M.P.A. (TABLA) SEMESTER –I
(W.E.F 2020-21)

MPAT 115B General History of Music & Musicology (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 115B	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Knowledge about structure of tabla and basic terms.**								
2.	**Capability to write composition with notation.**								
3.	**Memorizing taals and contribution of great maestro.**								
4.	**Knowledge of percussion instruments other than tabla & essay writing skill.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks .

UNIT-I

A) Introduction of different parts of Tabla in brief with sketch.
B) Definitions of the following:
Taal, Laya,Taali, Khali, Matra, Vibhag,Sam,Kayda, Palta, Tukda , Tihai.

UNIT-II

A) Meaning and requirement of notation system in Indian music.
B) Ability to write Theka, Kayda, Palta and Tihaai in Teentaal with notation.

UNIT-III

A) Introduction of the following taals in bief: Teentaal, Dadra.
B) life sketch of renowned tabla players: ustad zakir hussain ,ustad taari khan.

UNIT-IV

A) Knowledge of parts of following percussion instruments: Pakhawaj, Dholak.
B) Essay on any one of the following in 300 words: 1. Importance of practice in music,2. Merits of a good a learner.

M.P.A. (TABLA) SEMESTER –II
(W.E.F 2020-21)

Core Elective

MPAT 125A STAGE PERFORMANCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 125A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Comprehension of showing taal on hand with basic layakari.**								
2.	**Demonstrate basic syllables of tabla.**								
3.	**Capacity to accompany on tabla with bhajan.**								
4.	**To Perform Tabla solo.**								

Section-1

A) Recitation in Thah and Dugun laykari of rupak and kaherwa.
B)Ability to play of basic syllables like: Dhina -Gina,Tina- Gina,Tirkit etc.

Section-2

A) One Kayda of Teentaal based on syllable TIRKIT.
B) Ability of accompaniment with simple Bhajan based on Kaherwa taal.

Section-3

A) Two simple Tukdas and one Chakkardaar in Teentaal.
B) One simple Paran in teetaal.

Section-4

A) Complete solo performance in Teentaal about eight minutes duration without repetition of composition.
B) Ability to recitation of Tukda and Tihai on hand in Teentaal.

M.P.A. (TABLA) SEMESTER –II
(W.E.F 2020-21)

MPAT 125B Basic introduction of tabla & Musicology. (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 125B	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Characterize fundamentals of Indian classical music.**								
2.	**Understanding of Terminology of music and various theories of Indian classical music.**								
3.	**Knowledge of musical terms.**								
4.	**Capacity to describe taal and laya.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type which is compulsory. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks .

UNIT I

A) Origin and development of percussion instruments in brief.
B) Importance of Taal in music.

UNIT II

A) Knowledge of Pt. V.N. Bhatkhande Taal Notation system.
B) Ability to write Theka, Kayda, Palta and Tihaai in Teentaal with notation.

UNIT III

A) Definition of the following:
Chakkardar , Paran,Dhwani, Swar
B) Knowledge of following terminology: Tukra ,Chakkardar ,Damdar and Bedam Tihai.

UNIT IV

A) Introduction of the following taals in brief: Rupak , Tivra.
B) Importance of Laya in music.

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SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2021-22

1 credit =25 marks,

1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. Music Tabla III Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAT 235A	STAGE PERFORMANCE AND VIVA VOCE (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAT 235B	GENERAL HISTRY AND TEACHING SYSTEM (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. Music Tabla IV Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAT 245A	STAGE PERFORMANCE AND VIVA VOCE (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAT 245B	GENERAL HISTORY, BASIC TERMES AND NOTATION SYSTEM (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (TABLA) SEMESTER –III
(W.E.F 2021-22)

MPAT 235A STAGE PERFORMANCE AND VIVA VOCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 235A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Capacity to comprehend principles and fundamentals of Taal and laya.**								
2.	**Develops aptitude about the laya and citation.**								
3.	**Knowledge of systematic solo performance.**								
4.	**Effective accompaniment skill.**								

Section-1

A) Knowledge of Theka of the following Taals:
Jhaptaal, Ektaal, Rupak.

B)Tigun and chaugun Layakari of Teentaal.

Section-2

A) Citation of a simple tukda in teentaal.
B) One Peshkaar with two variation & Tihaai in Teentaal.

Section-3

A) One kayda of Adi laya with four Paltas and Tihai in Teentaal.
B) One Tukda and one Chhakkardaar in Teentaal.

Section-4

A) Ability to accompany with simple Bhajan in Dadra taal.
B) One Chakkardar Paran in Teentaal.

M.P.A. (TABLA) SEMESTER –III
(W.E.F 2021-22)

MPAT 235B GENERAL HISTRY AND TEACHING SYSTEM (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 235B	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Enhances the knowledge of musical terms.**								
2.	**Capability to differentiate instruments.**								
3.	**Knowledge about great performers of tabla and various singing styles.**								
4.	**Knowledge of notation with laykari and musical traditions.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type which is compulsory. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Definition of the following terms: Peshkar, Rela.
B) Definition of the following terms: Saptak, Naad.

UNIT II

A) Classification of Indian Instruments in brief.
B) Ang -Varnan of Pakhawaj.

UNIT III

A) Life sketch of Ustad Nathhu Khan, Pt Samta Prasad.
B) Brief introduction of various singing style: -
Dhrupad, Khayal, Thumri, Dadra.

UNIT IV

A) Brief study about Guru- Shishya Parampara and Gharana tradition in music.
B) Notation of following taal in Adi laya:Teentaal, Rupak.

M.P.A. (TABLA) SEMESTER –IV
(W.E.F 2021-22)

MPAT 245A STAGE PERFORMANCE AND VIVA VOCE (Practical)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 245A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Capacity to characterize different singing style**								
2.	**Perform tabla solo playing and various compositions.**								
3.	**Knowledge of layakari in some other taals**								
4.	**Enhances the aptitude of citation in different taals**								

Section-1

Knowledge of Theka of following Taal:
A) Deepchandi, B) Chautaal.

Section-2

A) One Kayda with six Paltas &Tihaai in Rupaktaal.
B) Three Tukdas and one Farmaishi chakkardaar in Rupak taal.

Section-3

Adi layakaari of following taal on hand: A) Rupak, B) Ektaal.

Section-4

A) Ability to citation of Tukra and Tihai on hand in Rupak taal.
B) Ability to identify following taals:
Rupak, Jhaptaal

M.P.A. (TABLA) SEMESTER –IV
(W.E.F 2021-22)

MPAT 245B GENERAL HISTORY, BASIC TERMES AND NOTATION SYSTEM (Theory)									
Core Elective	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 245B	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Knowledge of advance terms and sitting posture during tabla playing.**								
2.	**Understanding of notation system.**								
3.	**Capacity to secure ethical values through music.**								
4.	**Capacity to describe Delhi gharana.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type which is compulsory. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT -I

A) Definition of the following terms:Uthan, Gat, Laggi.
B) Brief study of sitting posture while playing tabla.

UNIT- II

A) Study of Paluskar Taal Notation System.
B) Notation of following taals in Adi laya: Deepchandi,Chautaal.

UNIT -III

A) Role of tabla in modern Indian Music.
B) Role of Indian Music to enhance moral values.

UNIT –IV

A) Brief knowledge of origin of Delhi Gharana.

B) Brief study of characteristics of playing style of Delhi Gharana.

Department of Music & Dance
Kurukshetra University, Kurukshetra
M.P.A. Music Tabla
Discipline Specific Course (DSC)
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks,

1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. Music Tabla V Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Course (DSC)	MPAT 355A	STAGE PERFORMANCE AND VIVA VOCE (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAT 355B	General History of Tabla, Gharana & Musicology (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. Music Tabla VI Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Course (DSC)	MPAT 365A	STAGE PERFORMANCE AND VIVA VOCE (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAT 365B	Basic introduction notation, Laykari & Musicology (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (TABLA) SEMESTER –V
Syllabus and Course of Reading
(W.E.F 2022-23)

MPAT 355A STAGE PERFORMANCE AND VIVA VOCE (Practical)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 355A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Knowledge of principles and fundamentals of taal.**								
2.	**Develops aptitude of accompaniment.**								
3.	**Ability to perform tabla solo in new taal.**								
4.	**Knowledge of playing kayda techniques of Delhi gharana.**								

Section-1

Knowledge of the Theka of the following Taals:-
A- Ada Chartaal. B-Dhamar.

Section-2

Ability to accompany with Drut khayal in following taals: A-Teen taal. B- Ektaal.

Section-3

A) Peshkar and Rela with four Paltas and Tihai in Jhaptaal.
B) One Kayda with four Paltas and Tihai in Jhaptaal.

Section-4

A) Two Tukdas, Kamali and Farmaish in Jhaptal of Delhi Gharana.
B) One Kayda with four Paltas and Tihai of Delhi Gharana in Teentaal.

M.P.A. (TABLA) SEMESTER –V
(W.E.F 2022-23)

MPAT 355B General History of Tabla, Gharana & Musicology (Theory)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 355B	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Capability to development of music in medieval period, and tabla solo.**								
2.	**Knowledge of comparative study of laya, laykari and taal system.**								
3.	**Knowledge of Ajrada Gharana and some great exponent of tabla.**								
4.	**Capacity to understand notation, and relation of music with other subjects.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type which is compulsory. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT I

A) Brief history of Tabla solo development.

B) Development of Indian Music in Medieval period in brief.

UNIT II

A) Comparative study of Karnatak and Hindustani taal system.

B) Comparative study of Laya and Laykari.

UNIT- III

A) Characteristics of Ajrada Gharana of Tabla.

B) Life sketch of the following: -

i) Ustad Habibudhin khan

ii) Ustad Nathhu khan

UNIT- IV

A) Ability to write notation of simple Tukda and Tihaai in Jhaptaal.

B) Short notes on the following: Music & Technology, Music & Yoga, Music & Sociology.

M.P.A. (TABLA) SEMESTER –VI
(W.E.F 2022-23)

MPAT 365A STAGE PERFORMANCE AND VIVA VOCE (Practical)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 365A	**4**	**100**	**80**	**20**	**15 -20 min / Student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Capability to perform solo tabla.**								
2.	**Knowledge of traditional composition of solo tabla in teentaal.**								
3.	**Knowledge of kayda in Ektaal.**								
4.	**Capacity to demonstrate layakaries on hand.**								

Section-1

A) Ability to perform tabla solo about 10 minutes in Teentaal.

Section-2

A) One Uthan, Peshkar with four variations and Tihaai in Teentaal.

B) One Farmaishi in Teentaal.

Section-3

A) One Rela, Gat & one Fard in Teentaal.

B) One Kayda with four Paltas & Tihaai in Ektaal.

Section-4

A) Showing layakaries on hand of Ektal- Thah, Dugun, Tigun and Chaugun.

M.P.A. (TABLA) SEMESTER –VI
(W.E.F 2022-23)

MPAT 365B Basic introduction notation, Laykari & Musicology (Theory)									
Discipline Specific Course (DSC)	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	MPAT 365B	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Capacity to differentiate between Baj and Gharana of tabla.**								
2.	**Knowledge of staff notation system, layakari, merits and demerits of percussionist.**								
3.	**Ability to perform Layakari.**								
4.	**Comprehension of aesthetical component.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type which is compulsory. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT I

A) Brief knowledge of Poorab Baj.

B) Development of Punjab Gharana.

UNIT-II

A) Brief study of Staff notation system.

B) Life sketch of the following:

Ustad Afaq hussain khan, Ustad Amir hussain khan.

UNIT-III

A) Knowledge of Kuad & Biad Layakari.

B) Study of Merits & Demerits of tabla and pakhawaj players.

UNIT- IV

A) Brief study on aesthetical component in tabla playing.

B) Shorts note on following -Types of accompaniment of Tabla, Music and Spiritualism, Music and Aesthetics.

Kurukshetra University, Kurukshetra
M.P.A. Music (TABLA)

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2023-24

1 credit =25 marks,.
1lecture = 1credit, 1Tutorial=1 credit, 2 Practical =1 credit.

M.P.A. VII th SEMESTER

Course	Papers Category	Papers	L+T+P	Code	Time	Credits	External	Internal	Total Marks
M.P.A.	Core-1	General History of Music & Musicology.	4+0+0	MPAT411	3 Hours	4	80	20	100
	Core-2	Theories of Compositions & Recording.	4+0+0	MPAT412	3 Hours	4	80	20	100
	Core-3	Stage performance	0+0+8	MPAT413	30 to 35Min/ student	4	80	20	100
	Core-4	Viva –Voce	0+0+8	MPAT414	30 to 35Min/ student	4	80	20	100
	Core Elective-5	Project Work (Composition, Music Arrangement /Programming and Recording Studio work)	0+0+4	MPAT415	30 to 35Min/ student	4	80	20	100
Total						20	400	100	500

Kurukshetra University, Kurukshetra
M.P.A. Music (TABLA)
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2023-24

1 credit =25
1lecture = 1credit, 1Tutorial=1 credit ,2practical =1 credit

M.P.A. VIII th SEMESTER

Course	Papers Category	Papers	L+T+P	Code	Time	Credits	External	Internal	Total Marks
M.P.A.	Core-1	General History of Music& Musicology.	4+0+0	MPAT421	3 Hours	4	80	20	100
	Core-2	Development of western music, studio and composition	4+0+0	MPAT422	3 Hours	4	80	20	100
	Core-3	Stage performance	0+0+8	MPAT423	30 to 35 Min/student	4	80	20	100
	Core-4	Viva -Voce	0+0+8	MPAT424	30 to 35 Min/student	4	80	20	100
	Core Elective-5	Project Work (Composition, Music Arrangement /Programming and Recording Studio work)	0+0+4	MPAT425	30 to 35 Min/student	4	80	20	100
	Open Elective-I	General History and Basics of Indian Music –I (Theory)	2+0+0	OEM1	3	2	40	10	50
Total						20	400	100	550

M.P.A. (TABLA) SEMESTER –VII
Syllabus and Course of Reading
(W.E.F 2023-24)

MPAT 411 General History of Music & Musicology (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAT 411**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Understanding of mathematical approach in music.**								
2.	**Ability to analyze musical sound.**								
3.	**Knowledge of ancient terms and creativity.**								
4.	**Comprehension of art & culture.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Interrelationship between music and mathematics.

B) Ability to write down the different laykaries in one Avartan.

UNIT-II

A) Analytical study of musical sounds based on principals of physics.

B) Explain the Marg taal system.

UNIT-III

A) Explain the term Shadang.

B) Role of Upaj in tabla playing.

UNIT- IV

A) Relationship of Music music &fine arts.

B)Brief study of percussion instruments of India: Dholak, Nagada.

M.P.A. (TABLA) SEMESTER–VII
(W.E.F 2023-24)

MPAT 412 Theories of Compositions & Recording (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAT 412**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Capacity to create compositions and its elaboration.**								
2.	**Ability to understand the layakaris and compositions.**								
3.	**Knowledge of recording studio- structure and equipments.**								
4.	**Enrich the student with social values through music.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Principals of composition of Kayda.

B) Theory of Peshkar and its elaboration.

UNIT-II

A) Study of the following layakaries and ability to write the notation of following taals –Rupak, Ektaal.
Paune gun (3/4), Sawa gun (5/4), Paune dogun (7/4).

B) Definition & explanation of the following terms: -
Chaupalli gat, Darjedaar gat, Stuti paran.

UNIT- III

A) Brief knowledge about structure of recording studio.

B) Brief study of recording studio equipments.

UNIT-IV

A) Interrelation of Bhagwad Gita with music.

B) Possibility of Music for employability in music.

M.P.A. (TABLA) SEMESTER –VII
(W.E.F 2023-24)

MPAT 413 Stage performance (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAT 413**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Ability to perform odd beat Taals.**								
2.	**Knowledge of advanced composition.**								
3.	**Capacity to perform with folk music.**								
4.	**Capacity of accompaniment with Dance.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Complete Solo performance about 15 minutes in 9 beats.

Section-2

One Punjabi gat and one Gat kayda in teentaal.

Section-3

Ability to accompany with folk music.

Section-4

Ability to accompany with Bada Khyal .

M.P.A. (TABLA) SEMESTER –VII
(W.E.F 2023-24)

MPAT 414 Viva –Voce (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAT 414**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Ability to perform complete tabla solo performance for 10 minutes other than teentaal.**								
2.	**Capacity to formulate different layakaris in taal.**								
3.	**Enrichment with traditional composition of different gharana.**								
4.	**Motivation for inculcating self-made composition.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Ability to perform tabla solo for10 minutes in other than Teentaal.

Section-2

Ability to play following taals in one Avartan onTeentaal: Ektaal, Jhaptaal, Rupak taal.

Section-3

Knowledge of composition in different Gharanas.

Section-4

Composing and playing ability of new Tukdas and Parans.

M.P.A. (TABLA) SEMESTER –VII
(W.E.F 2023-24)

MPAT 415 Project Work (Composition, Music Arrangement /Programming and Recording Studio work etc.) (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAT 415**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
	Course Outcomes								
1.	**Capacity to analyses and evaluate cultural events.**								
2.	**Enhances ability of composition.**								
3.	**Knowledge of studio recording.**								

Note- Presentation of class work record in checked note book at the practical Examination is compulsory

1. Submit a report of any one musical documentary / competition/concerts /event in print/online form. 40

2. Self-Composed /arranged Classical Musical Composition or creative work etc. in audio or video form will be Submitted and Presented by the student in practical exam. 20
3. Musical Arrangement/Programming by the Candidate in Light Music. 20

M.P.A. (TABLA) SEMESTER –VIII
Syllabus and Course of Reading
(W.E.F 2023-24)

MPAT 421 General History of Music& Musicology (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAT 421**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Knowledge of ancient percussion instruments and their playing styles.**								
2.	**Knowledge of evaluating modern and traditional music education.**								
3.	**Knowledge of western percussion instruments and Indian Ghan vadyas.**								
4.	**Knowledge of ancient Granthas and Taal system.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Brief study of playing style of Pushkar Vadya's mentioned in Natya Shasrtra.

B) Define the ancient instruments with sketch:
Panav, Patah .

UNIT-II

A) Development of music in educational institutions.

B) Merits and Demerits of Gharana Teaching.

UNIT-III

A) Describe the following western instruments:
Cattle Drum, Bass Drum, Tenner Drum,Tambourine .

B) Describe the following GhanVadya:
Ghanta, Khadtaal, Jhanjh,

UNIT-IV

A) Brief study of Deshi taal system in Sangit Ratnakar.

B) Brief introduction of the following Granthas:

M.P.A. (TABLA) SEMESTER –VIII
(W.E.F 2023-24)

MPAT 422 Development of western music, studio and composition (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAT 422**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Awareness about western music.**								
2.	**Knowledge about the folk music, and aesthetic in music.**								
3.	**Knowledge of primary recording.**								
4.	**Ability to make and write composition.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Brief history of western music.

B) Importance of rhythm in western music.

UNIT-II

A) Development of taal related to folk music.

B) Brief study of Ras in music.

UNIT-III

A) Knowledge about category of Microphones.

B) Brief knowledge of basic recording software.

Sound Forge

Audacity

UNIT-IV

A) Notation of composition like Tukda, Gat, Chakkardar in Teentaal.

B) Ability to write Tihai from different matras in Teentaal.

M.P.A. (TABLA) SEMESTER –VIII
(W.E.F 2023-24)

MPAT 423 Stage performance (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAT 423**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Capacity to perform advanced solo Tabla.**								
2.	**Ability to perform tabla solo in odd beat taal.**								
3.	**Comprehension of accompaniment with classical music.**								
4.	**Affinity with Nationalism.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Complete solo performance about 15 minutes other than Teentaal.

Section-2

Solo performance in 11 beat with Uthan, Peshkar, Kayda, Rela and Tukda about 10 minutes.

Section-3

Ability to accompany with Vilambit Khayal in Ektaal.

Section-4

Ability to accompany with National Anthem & Patriotic song.

M.P.A. (TABLA) SEMESTER –VIII

MPAT 424 Viva Voce (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAT 424**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Knowledge of complete solo tabla performance.**								
2.	**Ability to demonstrate the compositions of various gharana.**								
3.	**Learning of elaborating Kayda of Delhi gharana.**								
4.	**Enhances mathematical approach in taal.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Profound knowledge of Teentaal.

Section-2

One Gat of each: Lucknow and Farrukhabad gharana.

Section-3

Characteristics of kayda of Delhi gharana.

Section-4

Showing Aad and Kuad Layakaries on hand in Teentaal,and making of Tihaai prescribed in syllabus taal.

M.P.A. (TABLA) SEMESTER –VIII
(W.E.F 2023-24)

MPAT 425 Project Work (Composition, Music Arrangement /Programming and Recording Studio work etc.)(Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAT 425**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
	Course Outcomes								
1.	**Capacity to analyses and evaluate cultural events.**								
2.	**Ability to self-composed work.**								
3.	**Capability to produce musical project.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

1. Submit a report of any one musical documentary / competition/concerts /event in print/online form. 40

2. Self-Composed /arranged Musical Composition or creative work etc. in audio or video form, will be Submit and Presented by the student in practical exam. 20
3. Musical Arrangement/Programming by the Candidate for Light Music in One Composition. 10
4. Knowledge of recording software 10
   a) Sound Forge
   b) Audacity
   c) Movie Maker

Kurukshetra University, Kurukshetra
M.P.A. Music (TABLA)
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2024-25

1 credit =25 marks,
1lecture = 1credit, 1Tutorial=1 credit, 2 practical =1 credit

M.P.A. IXth SEMESTER

Course	Papers Category	papers	L+T+P	Code	Time	Credits	External	Internal	Total Marks
M.P.A.	Core-1	Ancient and modern Theory of Taal system & Gharanas.	4+0+0	MPAT 531	3 Hours	4	80	20	100
	Core-2	Multidisciplinary approach of music and contribution of musicologists	4+0+0	MPAT 532	3 Hours	4	80	20	100
	Core-3	Stage performance	0+0+8	MPAT 533	30 to 35 Min/ student	4	80	20	100
	Core-4	Viva -Voce	0+0+8	MPAT 534	30 to 35 Min/ student	4	80	20	100
	Core Elective	Project Work (Composition, Music Arrangement /Programming and Recording Studio work)	0+0+4	MPAT 535	30 to 35 Min/ student	4	80	20	100
	Open Elective-II	General History and Basics of Indian Music –II (Theory)	2+0+0	OEM2	3	2	40	10	50
Total						22	440	110	550

Kurukshetra University, Kurukshetra
M.P.A. Music(TABLA)
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2024-25

1 credit =25 marks,
1lecture = 1credit, 1Tutorial=1 credit, 1practical =1 credit

M.P.A. X th SEMESTER

Course	Papers Category	papers	L+T+P	Code	Time in Hours	Credits	External	Internal	Total Marks
M.P.A.	Core-1	Terminology of Tabla, chhand & Essay	4+0+0	MPAT 541	3	4	80	20	100
	Core-2	Multidisciplinay approach of music and contribution of musicologist	4+0+0	MPAT 542	3	4	80	20	100
	Core-3	Stage performance	0+0+8	MPAT 543	30 to 35 Min/student	4	80	20	100
	Core-4	Viva -Voce	0+0+8	MPAT 544	30 to 35 Min/student	4	80	20	100
	Core Elective	Project Work (Composition, Music Arrangement /Programming and Recording Studio work)	0+0+4	MPAT 545	30 to 35 Min/student	4	80	20	100
Total						20	400	100	500

M.P.A.(TABLA) SEMESTER –IX
Syllabus and Course of Reading
(W.E.F 2024-25)

MPAT 531 Ancient and modern Theory of Taal system & Gharanas (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAT 531**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Ability to analyses ancient and modern taal system.**								
2.	**Knowledge of ancient musicologist and ability to write on different aspects of music.**								
3.	**Knowledge of Mughal period and rabindra sangit.**								
4.	**Knowledge of south Indian classical instruments and dance forms.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers the whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) The relevance of Vadan vidhi of Pushkar vadya in modern context.
B) Comparative study of ancient and modern taal system.

UNIT-II

A) Brief introduction of following Shastrakaras-Abhinavgupta, Ahobal,
B) Essay on the following:
   i) Importance of listening in Music.
   ii) Tabla accompany with Kathak Dance.
   iii) Society,Culture & Music.

UNIT –III

A) Brief study of Rabindra Sangit Taal system.
B) Impact of Mughal period in Indian music.

UNIT IV

A) The introduction about south indian percussion instruments- Mridangam, Ghatam, Ganjira.
B) Brief study of south indian classical dance forms: Bharatnatyam, Kathakali, Kuchipudi, Mohiniattam.

M.P.A. (TABLA) SEMESTER –IX
(W.E.F 2024-25)

MPAT 532 Multidisciplinary approach of music and contribution of musicologists (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAT 532**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Ability to write various compositions in different taals.**								
2.	**Knowledge of electrical instruments and gharana of Delhi and Ajarana.**								
3.	**Knowledge about technical terms of recording studio.**								
4.	**Awareness about orchestra and interdisciplinary approach.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers the whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT –I

A) Abiliy to write vairius composition in the following taal:-
Rupak ,Jhaptaal , Ektaal.

B) Describe the different kinds of Paran.

UNIT-II

A) History & development of Electronical instruments in Music.

B) Comparative study of characteristics of Delhi Gharana & AjradaGharana of tabla.

UNIT-III

A) Awareness and use of DAW.

B) Brief study about Analog and Digital recording.

UNIT-IV

A) History & development of Orchestra in Indian Music.

B) Essay on the following:-

i) Inter relationship between Music & Literature.
ii) Music in context of globalization.
iii) Role of classical music in Film music.

M.P.A. (TABLA) SEMESTER –IX
(W.E.F 2024-25)

MPAT 533 Stage performances (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAT 533**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Ability to develop the skill of complete solo performance in rare taal.**								
2.	**Enrichment with advance composition.**								
3.	**Enrichment with tradition composition of different gharanas.**								
4.	**Ability of skillful accompaniment with instrumental music.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Complete solo performance about 15 minutes in 13 beat taal.

Section-2

Two Tukdas, one Chakkardaar and one Farmaishi in Teen taal.

Section-3

One LahauriGat, oneDarjedaar Gat, one Tukda of Tisra-jati in Teentaal.

Section-4

Ability to accompany with Masitkhani gat.

M.P.A. (TABLA) SEMESTER –IX
(W.E.F 2024-25)

MPAT 534 Viva Voce (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAT 534**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Capacity to perform in rare taal.**								
2.	**Ability to play pre-composed composition in rare taal.**								
3.	**Capability to perform with semi classical forms.**								
4.	**Understanding of different Laykaries.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Two Kayda one Rela with six Palta & Tihaai in 13 beat taal.

Section-2

Two simple Tukdas one Chakkardaar & one Farmaishi in 13 beat taal.

Section-3

Two Laggi with six Paltas & Tihaai in Kaherwa taal.

Section-4

Ability to show Layakari on hand.

M.P.A. (TABLA) SEMESTER –IX
(W.E.F 2024-25)

MPAT 535 Project Work (Composition, Music Arrangement /Programming and Recording Studio work) (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAT 535**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
	Course Outcomes								
1.	**Learning of reporting, analyzing of event /concert.**								
2.	**Capacity to create musical composition.**								
3.	**Potentiality to produce music through studio.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

1. Student has to prepare one Printed project report of musical competition/concerts /event in written report and video cd/online. 40

2. Self-Composed /arranged Musical Composition or creative work etc. in audio or video form, will be Submitted and Presented by the student in practical exam. 20

3. Musical Arrangement/Programming by the Candidate for Light Music/Folk music/Classical music in One Composition. 20

M.P.A. (TABLA) SEMESTER –X
Syllabus and Course of Reading
(W.E.F 2024-25)

MPAT 541 Terminology of Tabla, Chhand & Essay (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
1	**MPAT 541**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Knowledge of ancient technical terms.**								
2.	**Capability to analyze different styles of music and gharana.**								
3.	**Knowledge about different aspects of music.**								
4.	**Knowledge of technical terms of tabla playing and semi classical forms.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers the whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Brief study of Chhand and taal.

B) Brief study of Kaku & Kutup.

UNIT-II

A) The comparative study of Folk Music & Classical music.

B) Comparative study of Lucknow& Banaras Gharana of tabla.

UNIT-III

A) Essay on the following:-

i) Ancient and modern music education system in India.

ii) Role of music therapy in healing and stress management.

UNIT-IV

A) Short note on the following:-

i) Ladant ii) Farshbandi iii) Padaar iv) Daab-Gans.

B) Brief knowledge of the following semi classical forms:

i) Thumari ii) Dadra iii) Tappa.

M.P.A. (TABLA) SEMESTER –X
(W.E.F 2024-25)

MPAT 542 Multidisciplinary approach of music and contribution of musicologist (Theory)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
2	**MPAT 542**	**4**	**100**	**80**	**20**	**3**	**4**	**0**	**0**
	Course Outcomes								
1.	**Knowledge about great scholar's contribution.**								
2.	**Advance knowledge of composition and creating new Taal.**								
3.	**Basic Knowledge of music production.**								
4.	**Knowledge about terms of kathak dance and contribution of eminent musicologist.**								

Note: - There shall be **Nine** Questions; Question number **one** must be objective type compulsory and covers the whole syllabus. The candidate is required to attempt **FIVE** questions in all, selecting **ONE** question from each unit. All questions carry equal marks.

UNIT-I

A) Brief knowledge of Maseetkhani &Razakhani Gat.

B) Brief study of contribution of Baba Alauddin Khan in Indian Music.

UNIT-II

A) Study of different types of Rela.

B) Principles of Taal making.

UNIT-III

A) Basic knowledge of premixing and mastering.

B) Brief study of acoustics ansemble recording.

UNIT-IV

A) Brief knowledge of following terms related to Kathak Dance:-

i) Amad ii) Toda iii) Parmelu iv) Thaat.

B) Contribution of following musicologist :-

i) Dr.SubhadraChaudhari.

ii) Pt. Lalmani Mishra.

iii) Dr.Premlata Sharma.

M.P.A. (TABLA) SEMESTER –X
(W.E.F 2024-25)

MPAT 543 Stage performances (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
3	**MPAT 543**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Broaden the efficiency of student to perform tabla solo in odd beat taal.**								
2.	**Knowledge of compositions to perform 14 beat taal.**								
3.	**Enhances the capability to perform 7 beat taal**.								
4.	**Elaboration of area of accompaniment with other classical forms.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Ability to perform 15 minutes tabla solo in 15 beat taal.

Section-2

One Peshkar, one Kayda, one Rela, two Tukdas, one Chakkardaar in Adachartaal.

Section-3

Two laggi with six variations and Tihaai in Rupaktaal.

Section-4

Basic knowledge of accompaniment with Dhrupad and Dhamar.

M.P.A. (TABLA) SEMESTER –X
(W.E.F 2024-25)

MPAT 544 Viva Voce (Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
4	**MPAT 544**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**8**
	Course Outcomes								
1.	**Development of vision about solo tabla.**								
2.	**Enhance the aptitude of citation.**								
3.	**Development of aptitude of creativity**								
4.	**Enhances the interest of rhythmic exercise and calculation.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

Section-1

Solo performance about 10 minute in any chosen taal.

Section-2

Citation of different composition in any taal from the syllabus.

Section-3

Ability to compose Tukda, Tihai and Chakkardar in any given taal from the syllabus.

Section-4

Ability to show different Layakaries on hand in any given taal of syllabus.

M.P.A. (TABLA) SEMESTER –X
(W.E.F 2024-25)

MPAT 545 Project Work (Composition, Music Arrangement /Programming and Recording Studio work)(Practical)									
Core paper	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
5	**MPAT 545**	**4**	**100**	**80**	**20**	**30-35 min/ student**	**0**	**0**	**4**
	Course Outcomes								
1.	**Ability to prepare project report.**								
2.	**Capability to prepare musical composition.**								
3.	**Knowledge of music production.**								

Note- Presentation of class work record in checked note book at the practical examination is compulsory

1. Student has to prepare one Printed project report of musical competition/concerts /event in written report/online and video cd. 40

2. Self-Composed /arranged Musical Composition or creative work etc. in audio or videoform, will be Submitted and Presented by the student in practical exam. 20

3. Musical Arrangement/Programming by the Candidate for Light Music/Folk music/Classical in One Composition. 20

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks ,
1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

MPA (Kathak Dance) Semester - I

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAK117A	Stage Performance (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAK117B	Introduction of Indian Dance(Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. IInd Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAK 127A	Stage Performance (Practical)	0+0+8	4	15-20 min/student		80	20	100
	MPAK 127B	History of Kathak Dance (Theory)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (KATHAK DANCE) SEMESTER –I

MPAK 117A : Stage Performance(Practical)

Core Elective (Practical) **Max. Marks -100 (80 Ext.+20 I.A.)**
Credit – 4 **Time: 15-20 Minutes /student**

	Course Outcomes
1.	Knowledge of basic structure of Kathak Dance.
2.	Knowledge of basic syllables of Kathak Dance.
3.	Knowledge of basic taal of Kathak Dance.
4.	Knowledge of basic Layakari of Taal of Kathak Dance.

TEENTAAL

1. Practical demonstration of Teentaal with Harmoniyam (Nagma) & Tabla.

   (I)- Tatkar in Thaah, Dugun & Chaugun Layakaries. (II) Ability to take spins of 5 feet & 3 feet (II)- Simple Thaat-2, (III) Rangmanch ka tukda/Salami-1, (IVAmads-1, (V) Tukda/Toda-2, (VI) 10 types of hand movements with Tatkar-1, (VII) Simple Tihai-3, (VIII) Paran-1, (IX) Paran Judi Amad-1, (X) Parmelu-1, (XI) Kavitta-1, (XII) Simple Gat Nikas.
2. Abhinay- Shlok /Vandana-1
3. Padhanta of all the above mentioned items.
4. Ability to play Nagma and Theka of Taal from your syllabus.
5. Padhanta of Thaah, Dugun and Chaugun Layakaries on Hand of the following taals with its Interoduction.

   (I) Jhaptaal (II) Dadra .

M.P.A. (KATHAK DANCE) SEMESTER –I

MPAK 117B : Introduction of Indian Dance(Theory)

Core Elective (Theory) **Max. Marks -50 (40 Ext.+10 I.A.)**
Credit – 2 **Time: 3 Hrs.**

	Course Outcomes
1.	Knowledge about importance of Indian Classical Dance in Indian music & Arts.
2.	Basic knowledge of classical dances
3.	Basic Knowledge of Kathak Tradition
4.	Knowledge of basic technical terms of Natya & Taal.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

Unit –I

1. Meaning, definition and Kinds of the following terms-
a)- Kala, b)- Lalit Kala, c)- Sangeet, d)-Natya, e)- Nritta, f)- Nritya, g)- Classical- folk dance

2. Definition of the following terms-
a)- Taal, b) Laya, c)- Matra, d)- Vibhag, e)- Sam, f)- Taali, g)- Khali, h)- Aavartan, i)- Theka, j)-Tatkar, k)-Lahra.

Unit –II

3. Origin of Kathak Dance in detail.

4. General introduction of the classical dances of India & their exponents.
a)- BharatNatyam b)-Odissi.

Unit –III

5. Detail study of Gharana and its Importance in Kathak dance.
6. Detail study of Guru-Shishya Prampra.

Unit –IV

7. Ability to Write the notation of the following in Teentaal:-
a)- Tatkar, b)- Thaat, c)- Tihai, d)- Amad, e)- Tukda, f)- Paran, g)- Paran Judi Amad, h)- Chakardar Paran, i)- Chakardar Tukda, j)- Kavit, k)- Parmelu.

8. Ability to write the full description of the following Taals with notation of Thaah, Dugun, and Chaugun Layakaris:- a)-Teen Taal, b)Jhaptaal c)-Dadra .

M.P.A. (KATHAK DANCE) SEMESTER –II
MPAK 127A : Stage Performance(Practical)

Core Paper-1 (Practical) **Max. Marks -100 (80 Ext.+20 I.A.)**
Credit – 4 **Time: 15-20 Minutes /student**

	Course Outcomes
1.	Knowledge about importance of Indian Classical Dance (Kathak)
2.	Knowledge of basic technical terms of Kathak Dance.
3.	Knowledge of basic Taal of Kathak Dance.
4.	Knowledge of basic Layakari of Taal of Kathak Dance.

JHAPTAAL

1. Practical demonstration of Jhaptaal with Harmoniyam (Nagma) & Tabla including:-

   (I)- Tatkar in Thaah, Dugun & Chaugun Layakaries. (II) Ability to take spins of 5 feet & 3 feet (II)- Simple Thaat-2, (III) Rangmanch ka tukda/Salami-1, (IVAmads-1, (V) Tukda/Toda-2, (VI) 10 types of hand movements with Tatkar-1, (VII) Simple Tihai-3, (VIII) Paran-1, (IX) Paran Judi Amad-1, (X) Parmelu-1, (XI) Kavitta-1, (XII) Simple Gat Nikas (Teen Taal).

2. Abhinay- Shloka /Vandana -1

3. Padhanta of all the above mentioned items.

4. Ability to play Nagma and Theka of Taal from your syllabus.

5. Padhanta of Thaah, Dugun and Chaugun Layakaries on Hand of the following taals with its Interoduction.

(I) Kehrwa (II) Tilwara

M.P.A. (KATHAK DANCE)- SEMESTER –II
MPAK 127B : History of Kathak Dance (Theory)

Core Elective (Theory) **Max. Marks -50 (40 Ext.+10 I.A)**
Credit – 2 **Time: 3 Hrs.**

	Course Outcomes
1.	Detailed Knowledge about Origin and development of Indian Classical Dance (kathak) and Contribution of eminent artists.
2.	Knowledge of basic technical terms of Kathak and Haryanvi folk dance
3.	Basic knowledge of Gayan and Vaadan in Kathak.
4.	Basic Knowledge of notation system.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

Unit –I

1)- Detail study of origin, History and development of kathak dance.
2)- Study of different Gharanas (Lucknow & Jaipur) of Kathak dance.

Unit –II

3)- Definition of the following terms:-
a)- Tatkar, b)-Tihai, c)- Thaat, d)- Aamad, e)- Toda/Tukda, f)-Paran, g)- chakkardar, h)- Parmelu, i)- Gat Nikas, j)- Gat-bhav.

4)- Historical background of Folk Dances of Haryana.

Unit –III

5)- Contribution of eminent artists and their life sketches:
a) Bindadhin Maharaj, b) SundarPrasad, c)- Madam Menka.

6)- Importance of Gayan and Vaadan in Kathak Dance.

Unit –IV

7)- Ability to Write the notation of the following in Teentaal/Jhaptaal:-
a)- Tatkar, b)- Thaat, c)- Tihai, d)- Amad, e)- Tukda, f)- Paran, g)- Paran Judi Amad, h)- Chakardar Paran, i)- Chakardar Tukda, j)- Kavita, k)- Pramelu.

8)- Ability to write the full description of the following Taals with notation of Thaah, Dugun, and Chaugun Layakaris:- a)- Jhaptaal, b)- Keharwa, c)- Tilwara.

DEPARTMENT OF MUSIC & DANCE
KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2020-21

1lecture = 1credit, 1Tutorial=1 credit, 2 Practical =1 credit

MPA (Kathak Dance) Semester III

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAK 237A	Stage Performance (Practical)	0+0+8	4	15-20 Minutes /student		80	20	100
	MPAK 237B	Introduction of Indian Dance (Granthokta Lakshana)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. IVth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core Elective	MPAK 247A	Stage Performance (Practical)	0+0+8	4	15-20 Minutes /student		80	20	100
	MPAK 247B	History of Kathak Dance	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (KATHAK DANCE)- Semester- IIIrd

MPAK 237A : Stage Performance (Practical)

Core Elective (Practical) **Course Code –MPAK 237A**
Credit – 4 **Max. Marks -100 (80 Ext.+20 I.A.)**
Time: 15-20 Minutes /student

Objects /Purpose	**To enhance the Students' ability to perform and build their basics about kathak Dance.**
	Course Outcomes
1.	Knowledge of basic terms & structure of Kathak Dance.
2.	Enhance Knowledge of teen taal with new composition in Kathak Dance.
3.	Aptitude of citation Dhamar taal & Tivra on hand.

1. Practical demonstration of **Ektaal** with Harmoniyam (Nagma) & Tabla.
   (i) Tatkar in Thaah, Dugun, Tigun & Chaugun Layakaries..
   (ii) Four varieties of more Tatkar (Palte).
   (iii) Two simple That.
   (iv) Two varities of more speed of Amads.
   (v) One Paran Judi amad in More speed upto double Laya
   (vi) Two simple Tukdas and one Chakkardar Tukdas.
   (vii) Four Tihais with speed.
   (viii) Permelu- 1
   (xi) Sadi Paran-2, Chakradar Paran-1, Kavitta-1
   (x) Ability to take spins of 5 feet & 3 feet.
   (xi) Ability to play Nagma and Theka of Taal from your syllabus.

2. Abhinay- Bhajan / Stuti / Vandana (Any one)
3. Practice in Padhanta of all the above items.
4. Padhanta of Thaah, Dugun, Tigun and Chaugun Layakaries on Hand of the following taals with its Interoduction:-
   (I) –Tivra (II)- Dhamar.

5. Study of Teentaal in details: - Thaat, amad, Salaami, Tihayi, Chakkardar Tihayi, Tukda, Chakkradar Tukda, Paran, Paran-amad, Permelu, Gats Nikas, Ghunghat or Mukut Gat Bhava.

M.P.A. (KATHAK DANCE)- SEMESTER –IIIrd

MPAK 237B : Introduction of Indian Dance (Granthokta Lakshana)

Core Elective (Theory) **Course Code- MPAK 237B**
Credit – 2 **Max. Marks -50 (40 Ext.+10 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge of body posture and Ang Bhed of Kathak Dance and mythologies related to Dance.**
	Course Outcomes
1.	Detailed Knowledge about human body parts and different posture.
2.	Basic Knowledge of notation system.
3.	Knowledge of mythological stories and folk Dance.
4.	Develops aptitude about the laya and citation.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

Unit –I

1)- Role of Lord Shiva in Dance

2)- Brief study of the following-

(i) Abhinaya and its four aspects - (Angika, Vachika, Aharya, Satvik).

(ii) Brief study of Anga, Pratyanga & Upanga.

Unit –II

3)- Define the Asanyukta Hasta Mudras and their use in Kathak Dance according to Abhinaya Darpan.

4)- Define the following according to Abhinaya Darpana:- a) Shiro Bheda (Head movements), b) Griva Bheda (Eye glance).

Unit –III

5)- Stories related to Dance

Dances of Krishna:- (a) Kaliya Daman Leela, (b) Maharaas Leela (c) Makhanchori Leela.

6)- Historical background of Folk Dance of Punjab.

Unit –IV

7)- Ability to Write the notation of the following in Teentaal :-

a)- Tatkar, b)- Thaat, c)- Tihai, d)- Amad, e)- Tukda, f)- Paran, g)- Paran Judi Amad, h)- Chakardar Paran, i)- Chakardar Tukda, j)- Kavitta, k)- Pramelu.

8. Ability to write the full description of the following Taals with notation of Thaah, Dugun, Tigun and Chaugun Layakaris:- a)-Ek Taal, b)- Dhamar c)- Tivra.

M.P.A. (KATHAK DANCE) - Semester- IVth

MPAK 247A : Stage Performance (Practical)

Core Elective (Practical) **Course Code- MPAK247A**
Credit – 4 **Max. Marks -100 (80 Ext.+20 I.A.)**
Time: 15-20 Minutes /student

Objects /Purpose	**To provide a Foundation & enhance the Knowledge about performance in Dhamar taal and fluent citation on hand of different taal.**
	Course Outcomes
1.	Ability to perform complete kathak dance item in Dhamaar taal.
2.	Knowledge of technical terms like Vandna, Ganesh Paran, Gat-Nikas, Gat-Bhaav, Kavitt and Abhinya.

Study of **Dhamaar Taal** in detail-

1. Tatkar in Thaah, Dugun, Tigun and Chaugun Layas.
2. Three Paltas (varieties of more Tatkar).
3. Two Thaat, Tihai & Chakkradar Tihayi
4. Two Amads & one Paran Judi amad.
5. Two simple Tukdas/Toda.
6. Two simple Paran and one Chakradar Paran.
7. One Parmelu, Kavit and Ganesh-Paran.
8. One gat nikas/gat bhav in teen taal.
9. Ability to play Nagma and Theka of Taal from your syllabus.

2)- Padhant of all above items**.**

3)-Abhinay- Bhajan / Stuti / Vandana

4)- Padhanta of Thaah, Dugun, Tigun and Chaugun Layakaries on Hand of the following taals with its Interoduction:-

(I) Chautaal (II) Roopak

M.P.A. (KATHAK DANCE) SEMESTER –IVth
MPAK 247B :History of Kathak Dance

Core Elective (Theory) **Course Code- MPAK 247B**
Credit – 2 **Max. Marks -50 (40 Ext.+10 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge about different Gharana's of kathak dance, their repertoire and contribution of eminent scholars.**
	Course Outcomes
1.	Detailed Knowledge of different Gharana's of kathak dance.
2.	Enrich the students with importance of Ras, Bhaav and its kinds in kathak dance.
3.	Enrich the student with the knowledge of repertoire of Kathak dance.
4.	Develops aptitude about the notation of Laya and Laykari.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

Unit –I

1)-Definition of the following terms-
Vandana, Bhav, Kavitt, Kramalaya, Farmaisi, Aatit & Anagat.

2)- General introduction of the classical dances of India & their exponents.
a) Kathakali, b)- Kuchipudi, C)- Mohini Attam.

Unit –II

3) - Different Gharanas of kathak: Banaras and Raigarh shailley.

4) - Contribution of following Dance Guru in their respective area of specialisation:-
i) - Pt. Achchan Maharaj, ii)- Pt. Birju Maharaj, iii)- Sitara Devi

Unit –III

5) - Definition of Rasa, its Kinds and importance in Kathak Dance.
6) - Brief knowledge of the repertoire (Prastutikram) of Kathak dance.

Unit –IV

7. Ability to Write the notation of the following in Dhamaar taal :-
a)- Tatkar, b)- Thaat, c)- Tihai, d)- Amad, e)- Tukda, f)- Paran, g)- Paran Judi Amad, h)- Chakardar Paran, i)- Chakardar Tukda, j)- Kavit, k)- Parmelu.

8. Ability to write the full description of the following Taals with notation of Thaah, Dugun, Tigun and Chaugun Layakaris:- a)- Roopak, b)- Chautaal, c)- Dhamar.

DEPARTMENT OF MUSIC & DANCE
KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF EXAMINATION According to CBCS LOCF
W.E.F. 2022-23

1 credit =25 marks,
1lecture = 1credit, 1Tutorial=1 credit, 2 Prectical =1 credit

MPA (Kathak Dance) Semester -Vth
Discipline Specific Course (DSC)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Course (DSC)	MPAK 357A	Stage Performance (Practical)	0+0+8	4	15-20 Minutes / student		80	20	100
	MPAK 357B	Introduction of Indian Dance (Lakshya-Lakshana)	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (Kathak Dance) VIth Semester
Discipline Specific Course (DSC)

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Discipline Specific Course (DSC)	MPAK 367A	Stage Performance (Practical)	0+0+8	4	15-20 Minutes / student		80	20	100
	MPAK 367B	History of Kathak Dance	2+0+0	2	3 Hours	40		10	50
Total				6		40	80	30	150

M.P.A. (KATHAK DANCE)- Semester-Vth
MPAK 357A : Stage Performance (Practical)

Discipline Specific course (DSC) **Course Code- MPAK 357A**
Credit-4 **Max. Marks -100(80 Ext.+20 I.A.)**
Time: 15-20 Minutes /student

Objects /Purpose	**To prepare the students with skillful performance in teentaal, advance footworks, Gat-Nikas, Bhav & Abhinaya.**
	Course Outcomes
1.	Ability to perform a complete solo item in teentaal.
2.	Develop the aptitude of Abhinya, Gat-Nikas, Bhav & advance footworks.

1. Study of **Chautaal** in detail-

I. Tatkar in Thah, Dugun, Tigun, Chaugun, Four Paltas and Four Tihai.

II. Two Thaat.

III. Ganesh Paran/Shiv Paran.

IV. Two Amads & one Paran Judi Amad.

V. Two simple and One Chakradar Tukdas.

VI. Two simple and One Chakkardar Paran.

VII. One Pramelu.

VIII. Padhant of all the above items.

IX. Kavit

X. Abhinaya- Thumri / Bhajan / Hori / Dadra (Any one)

XI. Ability to play Nagma and Theka of Taal from your syllabus

2- Practice of varieties of Chakkars with ease and speed.

3- Padhant of all the above items

4- Padhanta of Thaah, Dugun, Tigun and Chaugun Layakaries on Hand of the following taals with its Interoduction:- (I) Chautal (II) Deepchandi Taal (III) Sultaal

5- Study of Teentaal in details: - Thaat, amad, Salaami, Tihayi, Chakkardar Tihayi, Tukda, Chakkradar Tukda, Paran, Paran-amad, Permelu, Gats Nikas, Ghunghat or Mukut Gat Bhava, Special advance Gat nikas- Bindi ki Gat / Rukhasar / Panghat leela, Kavit.

M.P.A. (KATHAK DANCE)- SEMESTER –Vth

MPAK 357B : Introduction of Indian Dance (Lakshya-Lakshana)

Discipline specific Course (DSC) **Course Code- MPAK 357B**
Credit – 2 **Max. Marks -50 (40 Ext.+10 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge of technical terms like Nayak-Naika bhed, Kinkini Lakshana, Sanyukta Hasta Mudras mentioned in Abhinaya Drapna & brief studey of NatyaShastra.**
	Course Outcomes
1.	Detailed Knowledge of technical terms related to dance mentioned in ancient granths.
2.	Brief knowledge of technical terms related to taal.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

Section-A

1)- Study of Dus Pran of Taal
2)- General introduction of NatyaShastsa and Abhinaya Darpana

Section-B

3)- Importance of Ghungroo in Kathak Dance.
4)- Study of Nayak and Nayika Bhedas.

Section-C

5)- Define the Sanyukta Hasta Mudras and their use in Kathak Dance according to Abhinaya Darpan.

6)- Knowledge of Nritt, Nritya and Natya.

Section-D

7) Notation of the following material in Chautaal :-
i)-Tatkaar, palta, Thaat, Amad, Toda, Tukda, Tihai, Paran, Chakkradar-Paran, Kavita.

ii) Notation of the following taals along with Thaah, Dugun, Tigun, Chaugun:- Chautaal, Dipchandi Taal and Sultaal.

8)- Critical and comparative study of following taals-
a)- Chautaal and Ektaal, b)- Dipchandi and Dhamaar, c) Sultaal and Jhaptaal.

M.P.A. (KATHAK DANCE)- Semester-VIth
MPAK 367A : Stage Performance (Practical)

Discipline specific Course (DSC)
Credit – 4

Course Code- MPAK 367A
Max. Marks -100 (80 Ext.+20 I.A.)
Time: 15-20 Minutes /student

Objects /Purpose	**To enhance the Students ability to perform and build their Artistic aptitude.**
	Course Outcomes
1.	Enhance the knowledge of perform in Pancham Sawari.
2.	Develops the confidence to perform as a musically mature and sensible artist.
3.	Ability to perform various aesthetic aspects like Abhinay, Ras and Bhav.

1- Panchamsawaari Taal

a) Tatkar in Thah, Dugun, Tigun, Chaugun, Four Paltas and Four Tihai.
Two Thaat.
b) Ganesh Paran/Shiv Paran.
c) Two Amads & one Paran Judi Amad.
d) Two simple and One Chakradar Tukdas.
e) Two simple and One Chakkardar Paran.
f) One Pramelu.
g) Special advance Gat nikas- Bindi ki Gat / Rukhasar / Panghat leela in teentaal
Padhant of all the above items.
h) Abhinaya- Thumri / Bhajan / Hori / Dadra (Any one)
i) Ability to play Nagma and Theka of Taal from your syllabus

2- Padhanta of Thaah, Dugun, Tigun and Chaugun Layakaries on Hand of the following taals with its Interoduction:-

(a) Basant Taal
(b) Adachautaal

M.P.A. (KATHAK DANCE)- Semester- VIth

MPAK 367B : History of Kathak Dance

Discipline specific course (DSC) **Course Code- MPAK 367B**
Credit – 2 **Max. Marks -50 (40 Ext.+10 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge of origin of Raas leela, Bhakti Movement and its impact on kathak dance and contribution of preservers of Kathak Dance.**
	Course Outcomes
1.	Impact of Fine Arts on kathak dance and form of kathak.
2.	Knowledge about expressional terms related to kathak and role of Kings in development of this form.
3.	Detailed Knowledge of other classical dance & notation system of Indian music.
4.	Knowledge of notation of layakari

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

Section-A

1)- Dance and its relation with other Fine Arts.
2)- Detail study of Taandav and laasya .

Section-B

3)- Brief introduction of Thumri, Kavit and its importance in Kathak Dance.
4)- Contributions of Nawab Wajid Ali Shah and Raja Chakradhar Singh in the development of Kathak dance.

Section-C

5)- General introduction of the classical dances of India & their exponents.
a)- Chhau, b)-Satriya, C)- Manipuri

6)- Knowledge of Notation System of Bhatkhande and Vishnu Digamber Taal lipi padhati and composition.

Section-D

7)- Critical and comparative study of following with example-
(i)-Tatkar and Theka, (ii)-Tora and Tukra, (iii)- Chakkardar and Tihai, (iv)- Paran and Paran judi Amad.

8)- Notation of the following material in Pancham Sawari Taal: -
i)- Tatkar, Thaat, Amad, Toda, Tukda, Tihai, Paran, Chakkradar Paran/Tukda, Pramelu, Kavit.
ii)- Notation of Theka in Thaah, Dugun, Tigun and Chaugun Laykari in Basant taal, Panchamsawari taal, and AdaChautaal.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2023-24

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.A. (Kathak Dance) VIIth Semester

Papers Category	**Code**	**Nomenclature**	**L+T+P**	**Credits**	**Time**	**Marks External**		**Internal**	**Total Marks**
						Theory	**Practical**		
Core-1	MPAK 411	Ancient and Modern History & Composition of Dance(Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MPAK 412	Dance in Granthas, Temple & Folk Dance (Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MPAK 413	Stage Performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAK 414	Viva-voce & Comparative study of Dance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective5	MPAK 415	Project work (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Total						20	400	100	500

MPA (Kathak Dance) VIIIth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAK 421	History and Development of Dance in literature(Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MPAK 422	Principles & Techniques of Performance & Folk Dance(Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MPAK 423	Stage performance (Practical)	0+0+8	4	30-35 Min.		80	20	100
Core-4	MPAK 424	Viva–Voce & Comparative study of Dance (Practical)	0+0+8	4	30-35 Min.		80	20	100
Core Elective5	MPAK 425	Project Work (Practical)	0+0+8	4	30-35 Min.		80	20	100
Open Elective	OEM1	Open Elective	2+0+0	2	3	40		10	50
Total						20	400	100	500

M.P.A. (KATHAK DANCE)- Semester -7

MPAK 411 Ancient and Modern History & Compositions of Dance(Theory)

Core Paper-1 (Theory) **Course Code MPAK 411**
Credit – 4 **Max. Marks- 100 (80 External+20 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge of Ancient and Modern History & origin of dance with Indian and western concept.**
	Course Outcomes
1.	Develop aptitude towards origin of dance according to Indian and western concept and contribution of eminent scholars.
2.	Ability to write different talas with differene layakaries.

Note : The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

SECTION -A

1)- History of Indian Dance:-
(a) Stone age
(b) Vedic period.

2) - Origin of dance according to Indian and western concepts.

SECTION – B

3) – Aesthetics- Principal of Aesthetics and its relation with dance.

4)- Contribution of the following in the field of Nritya Natika –
(i) Rabindra Nath Tagore (ii) Rukmini Devi Arundale iii) Uday Shankar

SECTION – C

5)- Comparitve study of Asanyukta and Sayukta Hasta Mudra according to-
a)- Natya Shashtra b)- Abhinaya Darpan

6)- Explain the following terms-
i)- Natyadharmi, ii)- Lokdharmi, iii)- Prekshyagriha.

SECTION – D

7) - Notation of compositions in Shikhar Taal and Teen Taal prescribed in the syllabus of practical.

8) - Notation of layakari such as Aad-3/2, kuaad- 5/4 and Biaad- 7/4 in Teen taal.

M.P.A. (KATHAK DANCE)- Semester- 7
MPAK 412 Dance in Granthas, Temple & Folk Dance (Theory)

Core Paper-2 (Theory) **Course Code MPAK 412**
Credit – 4 **Max. Marks-100 (80 External +20 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge of Dance in Granthas and Temple & Folk dance.**
	Course Outcomes
1.	Develops the interest towards Dance tradition in Temples, courts (Darbar) & Modern Stage in Indian.
2.	Develops the interest towards folk dance & dance drama tradition of India.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

SECTION -A

1) – Detail study of the sense of preparation in presenting the programme.

2) – Impact of the Place of performance of dance.

SECTION – B

3)- Knowledge and selection of the items according to occasion of dance performance.

4)- sense of the division of time in presenting the programme.

SECTION – C

5)- Study of the historical background of the folk dances of himachal Pradesh.

6)- Traditional folk drama – a) Tamasha, b) Nautanki, c) Bhavai, d) Pandwani.

SECTION – D

7)- Impact of make-up ,costume and jewellery in dance.

8) – Detail study of Rasa and Bhaav Dance.

M.P.A. (KATHAK DANCE)- Semester- 7
MPAK 413 Stage Performance(Practical)

Core Paper-3 (Practical) **Course Code- MPAK 413**
Credit – 4 **Max. Marks-100 (80 External +20 I.A.)**
Time: 30-35 Minutes/Per student

Objects /Purpose	**To enhance the ability of kathak dance solo performance with the knowledge of new compositions in teentaal and other taal.**
	Course Outcomes
1.	Ability to perform complete kathak dance solo performance for 15-20 minutes.
2.	Enhancement in Creativity and Systematic improvisation ability of students of katak dance.

Stage Performance of the following Taal with Costumes, Make-Up etc. (Including Taal paksha & Bhav-Abhinaya Paksha).

Talas – Shikhar Taal or Teentaal

1) Stuti/Vandana
2) Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3) Thaat
4) Aamad
5) Tihayi & Chakkradar Tihayi
6) Paran Judi Aamad
7) Saadi Paran & Paran (Tishra Jati)
8) Chakkardar paran
9) Anagat/Ateet Tukda (Any one)
10) Chakkardar toda/Tukda
11) Pramelu
12) Special bandish of Jaipur gharana
13) Kavitta.
14) Any one Gat Nikas/Gat Bhaav in Teen Taal.
15) One Tarana/Sargam/Tirwat/Chaturang in any Taal
16) Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.

M.P.A. (KATHAK DANCE)- Semester- 7
MPAK 414 Vive-voce & comparative study of Dance(Practical)

Core Paper- 4 (Practical) **Course Code- MPAK 414**
Credit – 4 **Max. Marks -100 (80 External +20 I.A.)**
Time: 30-35 Minutes/ student

Objects /Purpose	**To enhance the Students' ability to perform and demonstrate the kathak dance performance in different taals of prescribed syllabus.**
	Course Outcomes
1.	Develops the confidence level of students to perform in rare taals as well as in teen taal.
2.	Increased confidence to perform as a musically mature and sensible artist.

Practical demonstration and padhant of following technical elements in the given Taals.

A) Shikhar Taal and Teentaal

1) Stuti/Vandana
2) Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3) Thaat
4) Aamad
5) Tihayi & Chakkradar Tihayi
6) Paran Judi Aamad
7) Saadi Paran & Paran (Tishra Jati)
8) Chakkardar paran
9) Anagat/Ateet Tukda (Any one)
10) Chakkardar toda/Tukda
11) Pramelu
12) Special bandish of Jaipur gharana
13) Kavitta.
14) Any one Gat Nikas/Gat Bhaav in Teen Taal.
15) Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.
16) Ability to play Nagma and Theka of Taal from your syllabus.

b) Practical demonstration of any one Hindi cinema (dance) based on the following category.
1) Semi Classical dance
2) Contemporary/ Light Dance/ Bollwood Dance

c) Practical demonstration of any one Folk (dance) based on the following category.
1) Haryanvi & ii) Punjabi.

M.P.A. (KATHAK DANCE)- Semester 7
MPAK 415 Project Work (Practical)

Core Elective Paper- 5 (Project Work) **Course Code- MPAK 415**
Credit – 4 **Max. Marks-100 (80 External +20 I.A.)**
Time: 30-35 Minutes / student

Objects /Purpose	**To enhance the creativity and ability of preparing projects given on dance related areas and self-composed/arranged compositions or any other creative work related to the subject.**
	Course Outcomes
1.	Develop the aptitude of creative work among the students.
2.	Develop the interest to understand the global dance among the students.
3.	Enhance the ability to make composition.

1. Student has to prepare and submit a Written Project report in a printed form on the given Topic before practical examination. **25 Marks**

Or

***Student has to prepare a documentary on any given topic in video cd form.**

2. One report /review of a Music festival/seminar/workshop/competition/concerts/event in written form with soft copy in video cd. **10 Marks**

3. Self-Composed Dance Composition or creative work etc. in with soft copy in video C.D will be Submitted and Presented by the student in practical examination.

a)- Three Nrittang compositions in any choosen taal.

b)- Presentation (Bhav) on any choose Nritya (Abhinaya Paksha) composition like

Thumari/ Dadra / Gazal / Hori/Bhajan/Bhakti pad etc.

15x2= 30 Marks

Or

***Any other topic or new idea given by the teacher.**

4. Mini choreography based on Kathak Dance presented by the student in practical exam including soft copy in Video CD form.

15 Marks

Or

***Any practical oriented topic given by the teacher.**

M.P.A. (KATHAK DANCE)- Semester -8
MPAK 421 History and Development of Dance in literature(Theory)

Core Paper- 1 (Theory) **Course Code- MPAK 421**
Credit – 4 **Max. Marks-100 (80 External +20 I.A.)**
Time: 3 Hrs.

Objects /Purpose	**To enhance the knowledge about** Dance and drama references in Indian and other literature.
	Course Outcomes
1.	Develops interest about the knowledge of dance references in Indian and south East Asian literature and Contribution of eminent scholars.
2.	Ability to write down various talas in different layakaries and their comparative study.

Note :-The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

UNIT-I

1) - Dance references in literature: - (a) Ramayana (b) Mahabharata.

2) – Role of Shrimad Bhagwat Geeta in Dance.

UNIT-II

3) - Contribution of the following in the field of Nritya Natika -
a) - Madam Menka, b)- Uday Shankar & c)- Birju Maharaj.

4) - Explain of the following terms-
i) - Vritti, ii)- Chaari, iii)- Karan, iv)- Mandal, v)- Gati.

UNIT-III

5) – Knowledge of episodes from mythological stories of Dashavtaar and Kaaliya Daman.

6) - Study of Devta Hasta, Jati Hasta & Nav Graha Hast According to Abhinaya Darpan.

UNIT-IV

7) - Notation of compositions in Shikhar Taal, Basant taal and Teen taal prescribed in the syllabus of practical.

8)- Critical and comparative study of following taals-
a)- Ektaal and Chautaal, b)- Dhamar and Jhumra taal, C)- Rupak and Tivra, D)- Teen taal and Jatt taal.

M.P.A. (KATHAK DANCE)- Semester 8
MPAK 422 Principles & Techniques of Performance & Folk Dance (Theory)

Core Paper-2 (Theory) **Course Code- MPAK 422**

Credit – 4 **Max. Marks-100 (80 External +20 I.A.)**

Time: 3 Hrs.

	Course Outcomes
1.	To develops the interest towards technical terms related to dance performance and study of Raas sutra and its exposition.
2.	Knowledge about the relation of aesthetics with dance.
3.	Develops the interest towards folk dance & dance drama tradition of India.

Note : The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

UNIT-I

1) – Importance of Ghunghroo in Kathak.

2)- Selection and role of accompanying artists.

Unit -II

3)- Preparation for a successful performance in suitable and adverse conditions.
(a) Occasion (b) Audiance (c) Natural Condition (Effect of rain, Fog, Cold etc.)

4) – Relation between performance and accompanying artist.

UNIT-III

5)- Study of main folk dance of India-
a)- Kalbelia, b)-Kachhi Ghori, c)-Bhangra, d)- Giddha, e)- Dhamal.

6)- Study of Traditional folk drama – a)- Bidesiya, b)- Jatra, c)- Yakshagana, d)-Bhagvat Mela.

UNIT-IV

7) – Study of Indian cinema dancing and choreography.

8)- Knowledge of the relationship between Dance & Literature.

M.P.A. (KATHAK DANCE)- Semester- 8

MPAK 423 Stage Performance (Practical)

Core Paper- 3 (Practical) **Course Code- MPAK 423**
Credit – 4 **Max. Marks-100 (80 External +20 I.A.)**
Time: 30-35 Minutes/ student

Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic aptitude and compatibility to perform at higher level.**
	Course Outcomes
1.	Enhance Creativity and Systematic improvisation ability in students.
2.	Develops confidence to perform as a musically mature and sensible artist.

Stage Performance of any one Taal of the following with Costumes, Make-Up etc. (including Taal paksha & Bhav-Abhinaya Paksha)

Talas – Ashtmangal Taal (11 Matra) or Teentaal

1) Stuti/Vandana
2) Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3) Thaat
4) Aamad
5) Tihayi & Chakkradar Tihayi
6) Paran Judi Aamad
7) Saadi Paran & Paran (Tishra Jati)
8) Chakkardar paran
9) Anagat/Ateet Tukda (Any one)
10) Chakkardar toda/Tukda
11) Pramelu
12) Special bandish of Jaipur gharana
13) Kavitta.
14) Any one Gat Nikas/Gat Bhaav in Teen Taal.
15) One Tarana/Sargam/Tirwat/Chaturang in any Taal
16) Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.

M.P.A. (KATHAK DANCE)- Semester 8
MPAK 424 Vive-voce & comparative study of Dance (Practical)

Core Paper- 4 (Practical) **Course Code- MPAK 424**
Credit – 4 **Max. Marks -100 (80External +20 I.A.)**
Time: 35-40 Minutes/ student

Objects/ Purpose	**To enhance the Students' ability to perform and demonstrate the kathak dance performance in different taals of prescribed in syllabus.**
	Course Outcomes
1.	Develops the confidence level of students to perform in rare taals as well as in teen taal.
2.	Develops confidence to perform as a musically mature and sensible dance artist.
3.	Ability to perform various semi classical dance forms.

Practical demonstration and padhant of following technical elements in the given Taals.

A) Talas – Ashtmangal and Teentaal

1) Stuti/Vandana
2) Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3) Thaat
4) Aamad
5) Tihayi & Chakkradar Tihayi
6) Paran Judi Aamad
7) Saadi Paran & Paran (Tishra Jati)
8) Chakkardar paran
9) Anagat/Ateet Tukda (Any one)
10) Chakkardar toda/Tukda
11) Pramelu
12) Special bandish of Jaipur gharana
13) Kavitta.
14) Any one Gat Nikas/Gat Bhaav in Teen Taal.
15) One Tarana/Sargam/Tirwat/Chaturang in any Taal
16) Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.

b) Practical demonstration of any one Hindi cinema (dance) based on the following category.
1) Semi Classical dance
2) Contemporary/ Light Dance/ Bollwood Dance

c) Practical demonstration of any one Folk (dance) based on the following category.
i) Haryanvi, ii) Punjabi & iii) Rajasthani

M.P.A. (KATHAK DANCE)- Semester 8
MPAK 425 Project Work (Practical)

Core Elective Paper- 5 (Project Wark) **Course Code- MPAK 425**
Credit – 4 **Max. Marks- 100 (80 External+20 I.A.)**
Time: 30-35 Minutes/ student

Objects /Purpose	**To enhance the creativity and ability of preparing projects given on dance related areas and self-composed/arranged compositions or any other creative work related to the subject.**
	Course Outcomes
1.	Develop the aptitude of creative work among the students.
2.	Develop the interest to understand the global dance among the students.
3.	Enhance the ability to make composition in different taals.

1. Student has to prepare and submit a Written Project report in a printed form on the given Topic before practical examination. **25 Marks**

Or

***Student has to prepare a documentary on any given topic in video cd form.**

2. Two report /review of a Music festival/seminar/workshop/competition/concerts/event in written form with soft copy in video cd. **10 Marks**

3. Self-Composed Dance Composition or creative work etc. in written form with soft copy in video C.D will be Submitted and Presented by the student in practical examination.

a)- Five Nrittang compositions in any choosen taal.

b)- Presentation(Bhav) on any choose Nritya (Abhinaya Paksha) composition like

Thumari/ Dadra / Gazal / Hori/Bhajan/Bhakti pad etc.

15x2= 30 Marks

Or

***Any other topic or new idea given by the teacher.**

4. Mini choreography based on Kathak Dance presented by the student in practical exam including soft copy in Video CD form.

15 Marks

Or

***Any practical oriented topic given by the teacher.**

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2024-25
1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit
M.A. (Kathak Dance) IXth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAK 531	History and Development of Dance in Purans(Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MPAK 532	Therapeutic Aspects of Indian Classical Dance(Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MPAK 533	Stage Performance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core-4	MPAK 534	Viva-voce & Comparative study of Dance (Practical)	0+0+8	4	30-35 min/ student		80	20	100
Core Elective5	MPAK 535	Project work-(Practical)	0+0+8	4	30-35 min/ student		80	20	100
Open Elective	OEM-2	Open Elective	2+0+0	2	3	40		10	50
Total						20	400	100	500

MPA (Kathak Dance) X th Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Core-1	MPAK 541	History and Development of World Dance(Theory)	4+0+0	4	3 Hours	80		20	100
Core-2	MPAK 542	Indian Dance and Research Methodology (Theory)	4+0+0	4	3 Hours	80		20	100
Core-3	MPAK 543	Stage Performance (Practical)	0+0+8	4	30-35 Min./ Student		80	20	100
Core-4	MPAK 544	Viva-voce & Comparative study of Dance (Practical)	0+0+8	4	30-35 Min./ Student		80	20	100
Core Elective5	MPAK 545	Project work (Practical)	0+0+4	4	30-35 Min./ Student		80	20	100
Total			28	20		160	240	100	500

M.P.A. (KATHAK DANCE)- Semester 9
MPAK 531 History and Development of Dance in Purans (Theory)

Core Paper -1 (Theory) **Course Code- MPAK 531**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 3 Hrs.

	Course Outcomes
1.	Develops interest towards origin of dance mentioned in Purans.
2.	Develops aptitude about the application of different theoretical Aspects and their techniques related to Dance.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

UNIT-I

1)- Dance references in Puranas (Kalika, Harivansha, Shiva & Shrimadbhagvat).

2) Comparative study of Raasleela and Raasnritya.

UNIT-II

3) -Role of Ballet dances in the development of Indian Ballet and dance drama tradition.

4) – Knowledge of Natyashastra according to chapetrization.

UNIT-III

5) - Study of Mandal, Utpalvan, Sathanak, Bharmari & Pada Bheda According to Abhinaya Darpan.

6) - Life sketches of Bharat Muni and Nandikeshwar with special reference to the literary contributions in music and dance.

UNIT-IV

7)- Comparative study of following with example-
(i)-Tatkar and Theka, (ii)-Tora and Tukra, (iii)- Chakkardar and Tihai, (iv)- Paran and Paran judi Amad, (v)- Laya and Layakari, (vi)- Farmaisi and Kamaali

8)- (a)- Notation of compositions in Basant Taal and Teen taal prescribed in the syllabus of practical.
(b)- Notataion of layakari such as Aad, kuaad and Biaad in Teentaal, Jhaptaal & Ektaal.

M.P.A. (KATHAK DANCE)- Semester 9

MPAK 532 Principles, Technique & Therapeutic Aspects of Classical Dance (Theory)

Core Paper -2 (Theory) **Course Code -MPAK 532**

Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**

Time: 3 Hrs.

	Course Outcomes
1.	Motivates the students to acquire knowledge about Interdisciplinary Aspects of Indian dance.
2.	Develops aptitude about the application of different theoretical Aspects.

Note:-The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks. (16x 5=80).

UNIT-I

1) Music Therapy with special reference to dance and Yoga.

2) Psychology of audience, relationship between artist and audience.

UNIT-II

3) - Taal Das Prana in general with a detailed study of Graha, Jati & Yati

4) – Detail study of Tribal dances of India.

Unit-III

5) – Social, religious, political, geographical and cultural impact on Indian dances

6) – Renowned Indian innovators and chorographers in field of Kathak.

Unit-IV

7) Music and Media : -

a)- Importance of Computer, Internet & Television in Popularizing of Indian classical Dance.

b) - Importance of Print Media in popularizing classical Dance through Books, Newspapers, Magazines, Journals etc.

8) Role of Gharana system and Guru-Shishya tradition (Prampra) for the preparation of successful performer.

M.P.A. (KATHAK DANCE)- Semester- 9
MPAK 533 Stage Performance(Practical)

Core Paper-3 (Practical) **Course Code- MPAK 533**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 30-35minuts/Student

	Course Outcomes
1.	Ability to perform complete kathak dance solo performance for 15-20 minutes.
2.	Develops the aptitude of Creativity and Systematic improvisation ability among students of katak dance.

Stage Performance of any one Taal of the following with Costumes, Make-Up etc. (including Taal paksha & Bhav-Abhinaya Paksha)

Taals: - Basant Taal or Teentaal

1) Stuti/Vandana
2) Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3) Thaat
4) Aamad
5) Tihayi & Chakkradar Tihayi
6) Paran Judi Aamad
7) Saadi Paran & Paran (Tishra Jati)
8) Chakkardar paran
9) Anagat/Ateet Tukda (Any one)
10) Chakkardar toda/Tukda
11) Pramelu
12) Special bandish of Jaipur gharana
13) Kavitta.
14) Any one Gat Nikas/Gat Bhaav in Teen Taal.
15) One Tarana/Sargam/Tirwat/Chaturang in any Taal
16) Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.

M.P.A. (KATHAK DANCE)- Semester 9
MPAK 534 Vive-voce & comparative study of Dance (Practical)

Core Paper- 4 (Practical) **Course Code- MPAK 534**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 30-35minuts/Student

Objects /Purpose	**To enhance the Students' ability to perform and demonstrate the kathak dance performance in different taals of prescribed syllabus.**
	Course Outcomes
1.	Develops confidence to perform like a skilful and sensible artist.
2.	Increased confidence to perform as a musically mature and sensible artist.

Practical demonstration and padhant of following technical elements in the given Taals.

A)- Raas taal :- 1.Tatkar, ekgun, dugun, Chaugun., 2. Thaat, 3. Amad. 4. Paran Judi Aamad, 5. Paran (Tisar Jati), 6. Chakkardar Paran, 7. Anagat Tukda, 8. Chakkardar toda/Tukda, 9. Special bandish of Jaipur/Lucknow gharana, 10. Kavit, 11. Tehai.

B)- Basant Taal and Teentaal

1) Footwork ----- ladi
2) Ateet/AnagatTukda (Any one)
3) Two example of Jati & yati.
4) Tatkar of Boljati ----(Tishra,chatusra,khanda, mishra, sankirna etc.)
5) Farmaishi /Kamali
6) Kramlaya up to athgun.
7) Gatbhav on any one Nayika of Astanayika/Makhan Chori/other any
8) Kavitta

C) - Any one Abhinaya Paksha- (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad Etc.

D) - Practical demonstration of any one Hindi cinema (dance) based on the following category.

1) Semi Classical dance/Contemporary/Light Dance.
2) Folk based dance .

M.P.A. (KATHAK DANCE)- Semester- 9
MPAK 535 Project Work (Practical)

Core Elective Paper- 5 (Project Work) **Course Code- MPAK 535**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 30-35minuts/Student

	Course Outcomes
1.	Develops the aptitude of creative work among the students.
2.	Develops a vision to understand the dance at global platform.
3.	Enhance the ability to make new composition.

1. Student has to prepare and submit a Written Project report in a printed form on the given Topic before practical examination.
25 Marks
Or
***Student has to prepare a documentary on any given topic in video cd form.**

2. One report /review of a Music festival/seminar/workshop/competition/concerts/event in written form with soft copy in video cd. **10 Marks**

3. Self-Composed Dance Composition or creative work etc. in written form with soft copy in video C.D will be Submitted and Presented by the student in practical examination.

a)- Three Nrittang compositions in any choosen taal.

b)- Presentation(Bhav) on any choose Nritya (Abhinaya Paksha) composition like

Thumari/ Dadra / Gazal / Hori/Bhajan/Bhakti pad etc.

15x2= 30 Marks

Or
***Any other topic or new idea given by the teacher.**

4. Mini choreography based on Kathak Dance presented by the student in practical exam including soft copy in Video CD form.

15 Marks

Or
***Any practical oriented topic given by the teacher.**

M.P.A. (KATHAK DANCE)- Semester-10
MPAK 541 History and Development of World Dance(Theory)

Core Paper- 1 (Theory) **Course Code –MPAK 541**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 3 Hours

	Course Outcomes
1.	Develops interest to understand the structure, body posture and costume of ancient Indian dance as well as western ballet dance in context of globalization.
2.	Spreads knowledge about the application of different performance related aspects and technical terms mentioned in Granthas.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

UNIT-I

1) General study of Western Ballet - origin, history and development.

2) Study of Western Ballet- (a) Italian (b) French (c) Russian

UNIT-II

3) Study of Gati Bheda & Chari According to Abhinaya Darpan.

4) Study of origin, history & development of Tandava & Lasya according to mythological stories.

UNIT-III

5) Angaharas – General study of Angaharas & detailed study of 5 Angaharas.

6) Karan– General study of Karanas, detailed study of 5 Karanas.

UNIT-IV

7) - Critical and comparative study of following with example-
(i)- Farmaisi and Kamaali, (ii)- Jaati and Yati, (iii)- Tripalli and Chaupalli,
(iv)- Atit and anagat, (v)- Laya and Layakari.

8) - a)- Notation of the all material of Taals which has given in the syllabus of practical.
b) - Notataion of layakari such as Aad, kuaad and Biaad in Teentaal, Raas Taal & Roopa Taal.

M.P.A. (KATHAK DANCE)- Semester- 10
MPAK 542 Indian Dance and Research Methodology(Theory)

Core Paper -2 (Theory) **Course Code- MPAK 542**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 3 Hours

	Course Outcomes
1.	Develops the interest about the Indian dance tradition and the structure of modern dance in Gharana teaching as well as university teaching.
2.	Develops aptitude about research methodologies in dance.

Note:- The question paper will be divided in to **Five** section with the total of **Nine** questions in all. First question will be compulsory and contains **Eight** objective types Question (8×2=16). Which will covers whole syllabus. The candidates will have to attempt five questions in all selecting at least one question from each section. All questions will carry equal marks.(16x 5=80)

UNIT-I

1) - Contribution of Government of India and different Private Institute for the development of Kathak Dance.

2) - Merits and demerits of Traditional (Gharana) teaching and university teaching system.

UNIT-II

3) - Contribution of Devadasi System in Indian Dance tradition.

4) - Devadasi system in the different region of India.

UNIT-III

5- Essays on Music & Dance

g) Globalization and Indian Dance.
h) Role of Music & Dance In National Integration
i) Role of Music & Dance in all round development of a child.
j) Suggestions for popularizing Indian Classical Dance (Kathak) in schools and colleges.

Unit-IV

6)- Research Methodology in Music

e) The methodologies of research in music (Dance).
f) Preparing synopsis, data collection, field work, writing project reports, finding bibliography, reference material etc.
g) Study of interrelation between textual and oral tradition.
h) Review of a Music book

M.P.A. (KATHAK DANCE)- Semester-10
MPAK 543 Stage Performance (Practical)

Core Paper- 3 (Practical) **Course Code -MPAK 543**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 30-35minuts/Student

Objects /Purpose	**To enhance the Students' ability to perform and build their Artistic approach and compatibility to perform as an skillful artist.**
	Course Outcomes
1.	Enhance Creativity and Systematic improvisation ability in students.
2.	Develop confidence to perform as a musically mature and sensible artist.

Stage Performance of any one Taal of the following with Costumes, Make-Up etc. (including Taal paksha & Bhav-Abhinaya Paksha)

Taals: - Raas Taal or Teentaal

1. Stuti/Vandana
2. Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3. Thaat
4. Aamad
5. Tihayi & Chakkradar Tihayi
6. Paran Judi Aamad
7. Saadi Paran & Paran (Tishra Jati)
8. Chakkardar paran
9. Anagat/Ateet Tukda (Any one)
10. Chakkardar toda/Tukda
11. Pramelu
12. Special bandish of Jaipur gharana
13. Kavitta.
14. Any one Gat Nikas/Gat Bhaav in Teen Taal.
15. One Tarana/Sargam/Tirwat/Chaturang in any Taal
16. Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.

M.P.A. (KATHAK DANCE)- Semester- 10
MPAK 544 Vive-voce & comparative study of Dance (Practical)

Core Paper- 4 (Practical) **Course Code- MPAK 544**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 30-35minuts/Student

Objects/ Purpose	**To enhance the Students' ability to perform and demonstrate the kathak dance performance in different taals of prescribed in syllabus.**
	Course Outcomes
1.	Develops the knowledge about the performance in rare taals as well as in teen taal.
2.	Develops confidence about citation of compositions in different talas.
3.	Ability to perform various semi classical, folk and light dance forms.

Practical demonstration and padhant of following technical elements in the give Taals.

A)- Raas Taal and Teentaal

1) Stuti/Vandana
2) Tatkar : Thaah , dugun, Tigun & chaugun with Palta/Ladi
3) Thaat
4) Aamad
5) Tihayi & Chakkradar Tihayi
6) Paran Judi Aamad
7) Saadi Paran & Paran (Tishra Jati)
8) Chakkardar paran
9) Anagat/Ateet Tukda (Any one)
10) Chakkardar toda/Tukda
11) Pramelu
12) Special bandish of Jaipur gharana
13) Kavitta.
14) Any one Gat Nikas/Gat Bhaav in Teen Taal.
15) One Tarana/Sargam/Tirwat/Chaturang in any Taal
16) Any one Abhinaya paksha (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad etc.

B)- Teen Taal (16 matra).

1) Footwork ----- ladi/ chalan
2) Uthaan
3) Ateet/AnagatTukda

4) Two example of Jati & yati.
5) Tatkar of Boljati ----(Tishra,chatusra,khanda, mishra, sankirna etc.)
6) Farmaishi /Kamali (Any one)
7) Kramlaya up to athgun.
8) Special advance Gatnikas & Gatbhav on any one Nayika of Astanayika/Ghunghat/other any.
9) Kavitta/ One Tarana in any Taal.

C) - Any one Abhinaya Paksha- (Thumari/Dadra/Gazal/Kajri/Hori/Bhajan/Bhakti pad) etc.

D) - Practical demonstration of any Two Hindi cinema (dance) based on the following category:- 1) Semi Classical dance/Contemporary/Light Dance 2) Folk based dance.

M.P.A. (KATHAK DANCE)- Semester-10
MPAK 545 Project Work (Practical)

Core Elective Paper- 5 (Project Work) **Course Code- MPAK 545**
Credit – 4 **Max. Marks- 100 (80External +20 I.A.)**
Time: 30-35minuts/Student

	Course Outcomes
1.	Develop the aptitude of creative work among the students.
2.	Develop the interest to understand the global dance among the students.
3.	Enhance the ability to make composition in different taals.

1. Student has to prepare and submit a Written Project report in a printed form on the given Topic before practical examination.

25 Marks

Or

***Student has to prepare a documentary on any given topic in video cd form.**

2. Professional Portfolio: TheEnterprising artist- Work with a professional choreographer.

10 Marks

3. Self-Composed Dance Composition or creative work etc. in written form with soft copy in video C.D will be Submitted and Presented by the student in practical examination.

a)- Five Nrittang compositions in any choosen taal.

b)- Presentation(Bhav) on any choose Nritya (Abhinaya Paksha) composition like

Thumari/ Dadra / Gazal / Hori/Bhajan/Bhakti pad etc.

15x2= 30 Marks

Or

***Any other topic or new idea given by the teacher.**

4. Mini choreography based on Kathak Dance presented by the student in practical exam including soft copy in Video CD form.

15 Marks

Or

***Any practical oriented topic given by the teacher.**

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA

M.P.A. (English)
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2020-21 in Phased manner

1 credit =25 marks , 1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

Semester	Papers	Course Code	Nomenclature	L+T+P	Credits	Time	External	Internal	Total Marks
Ist	Core	MPAE 112	English (Core)	6+0+0	6	3 Hours	120	30	150
IInd	Core	MPAE 122	English (Core)	6+0+0	6	3 Hours	120	30	150
IIIrd	Core	MPAE 232	English (Core)	6+0+0	6	3 Hours	120	30	150
IVTh	Core	MPAE 242	English (Core)	6+0+0	6	3 Hours	120	30	150
Vth	GE-1	MPAE 352	Genric Elective	6+0+0	6	3 Hours	120	30	150
VIth	GE-2	MPAE 362	Genric Elective	6+0+0	6	3 Hours	120	30	150
Total					36		720	180	900

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
SYLLABUS AND COURSES OF READING
(W.E.F 2020 -21)
M.P.A. Semester I
MPAE 112 ENGLISH (CORE)

Credits-6 **Total Marks- 150 (120+30 I.A.)**
Course Code- MPAE 112 **Time- 3 Hrs.**

Course Objectives

The course intends to enable the students to understand the basics of grammar and usage. It has been designed to enrich the cognitive fecundity through verbal and non-verbal communication. It also seeks to enable the students to appreciate the poetic compositions. The use of poetic devices will enthuse and enlighten the learning minds to extol the beauty of composition. It will enable the students to understand the intricacies of language and literature.

Course Outcomes

After the successful completion of the course the student will be able to-

1. understand the basics of grammar.
2. understand the difference of Received Pronunciation (RP) and Indian English.
3. grasp and recognize the phonetic symbols.
4. comprehend poetry and its different forms.
5. use tenses through different modules.

Instructions for the Paper Setter and the Students:

Note: All questions are compulsory. Marks have been indicated after each question.

Q.1This question will be based on phonetic transcription of one/two syllabic words taken from the prescribed text. The students shall transcribe fifteen words out of given twenty.

(For blind Candidates only): - Word meaning of the words from the prescribed text. Students will be required to give meaning of any fifteen words out of given twenty. (15)

Q.2This question will be short answer type based on the text book. The students shall answer any five out of the given seven short questions (in about 30 words each). (15)

Q.3This question will be designed to assess the understanding of the text by the students. The students shall answer any five out of the given eight questions based on text (in about 100 words each). (25)

Q.4This question will be based on a comprehension passage from the text followed by six questions.

(12)

Q5 This question will be based on vocabulary from the he text. The students shall attempt questions on vocabulary as directed. (e.g. framing sentences of their own or giving various forms of the given words, synonyms, antonyms, one-word substitutes). The students shall answer any ten out of the given fifteen words. (10)

Q.6 This question will be based on grammar. It will consist of two parts:

(a) This part will be based on the use of tenses. The students shall attempt fifteen out of eighteen questions. (15)

(b) This will be based on parts of the speech. The students shall attempt fifteen out of eighteen questions. (15)

Q.7 The students shall write one paragraph (in about 200 words) on any one of the four topics given. (13)

Prescribed Text: *Language and Literature I (Short stories) (To be edited)*

The following short stories are prescribed:

	Name of the writer	**Name of the story**
1.	Leo Tolstoy	God Sees the Truth but Waits
2.	Anton Chekhov	Grief
3.	Rabindra Nath Tagore	The Cabuliwalla
4.	O' Henry	The Last Leaf
5.	Ruskin Bond	The King and the Tree Goddess
6.	Munshi Prem Chand	Child
7.	Mulk Raj Anand	The Gold Watch
8.	Anita Desai	Pigeons at Daybreak
9.	Shashi Deshpande	The Beloved Charioteer

Grammar and Composition

1. Noun: Types of nouns
2. Pronouns: Reflective, Personal, Demonstrative, Relative, Possessive
3. Adjective: Kinds and Comparison
4. Adverb: Position
5. Tenses
6. Verb: Kinds- Main, Auxiliary; Transitive, Intransitive
7. Conjunction
8. Phonetics: Symbols, Organs of speech, Transcription
9. Paragraph writing

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
SYLLABUS AND COURSES OF READING
(W.E.F 2020 -21)
M.P.A. Semester II
MPAE 122 ENGLISH (CORE)

Credits-6 **Total Marks- 150 (120 + 30 I.A.)**
Course Code- MPAE 122 **Time- 3 Hours**

Course outcomes:

1. Will be able to differentiate between poetry and prose.
2. Perusal of short stories and essays will enrich their knowledge of tradition and culture.
3. Components of grammar like Preposition, Article, Subject-verb agreement will provide close understanding of grammatical parameters
4. Able to transcribe two/ three syllabled words.

Instructions for the Paper Setter and the Students:

Note: All questions are compulsory.

Q.No.1 (a) Transcription of one/two syllabic words taken from the prescribed text. Students will be required to transcribe any ten out of the given fifteen words.

(For blind Candidates only): - Word meaning of the words from the prescribed text.
Students will be required to give meaning of any ten words out of given fifteen words. (10)

(b) Students will be required to give antonyms as well as synonyms of any ten out of the given fifteen words. (10)

Q.2 Very short answer type text-based questions: Students will be required to answer any six out of the given eight questions in about 50 words each. (18)

Q.3 Long answer type questions based on the text: Students will be required to attempt on any three out of the given six questions in about 150-200 words each. (30)

Q.4(a) Grammar: This question will be based on the grammar topics given in the syllabus. Students will be required to attempt any twenty-five out of the given thirty. (25)

(b) Do as directed (Topics based on the following grammar topics covered in Semester-I: Article, Prepositions, Adverbs, adjectives & Conjunctions). Students will be required to attempt any fifteen out of the given twenty. (15)

Q.5 Composition: Students will be required to write a letter (formal/ informal) out of the given two.

Text Book: *Language and Literature II* **(Essays) (To be edited)**

1. Charles Lamb : Dream Children: A Reverie
2. E. M. Forster : Tolerance
3. Louis Fischer : Gandhi and the Western World
4. Nirad C. Chaudari : Public Transport in London
5. R. K. Narayan : Toasted English
6. Nirmal Verma : Language and National Identity
7. APJ Abdul Kalam : Great Books Born out of Great Minds
8. G. B. Shaw : Spoken English and Broken English

Grammar and Composition

1. Sentences: Types
2. Modals
3. Subject-verb agreement
4. Voice
5. Narration
6. Phrasal Verbs
7. Punctuation
8. Transcription
   Letter writing

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
SYLLABUS AND COURSES OF READING
(W.E.F 2021 -22)
M.P.A. (Semester III)
MPAE 232 English (Core)

Credits-6 **Total Marks- 150 (120 + 30 I.A.) Course Code- MPAE 232** **Time- 3 Hours**

Course Outcomes:

1. Able to appreciate the nuances of poetry through different forms.
2. Extensive use of grammar like finite, non-finite verbs, clauses, verb patterns etc.
3. Able to enrich vocabulary.
4. Able to transcribe the words phonemically

Instructions for the Paper Setter and the Students:

Note: All questions are compulsory. Marks have been indicated against each question.

Q.1 Explanation of two stanzas out of the given four from the prescribed text with reference to the contest. (20)

Q.2 This question will be based on "Important Forms and Devices" given in the text book. The students shall answer any four out of the given six. (in about 30 words each). (12)

Q.3 This question will be designed to assess the understanding of the text by the students. The students shall answer any three out of the given five questions based on the text (in about 150 words each). (18)

Q.4 This question will be based on phonetic transcription of the words taken from the prescribed text. The students shall transcribe ten words out of the given fifteen.

(For blind Candidates only):- Word meaning of the words from the prescribed text. Students shall be required to give meaning of any ten out of given fifteen words. (10)

Q5 This question will be based on grammar exercises from the he text. The students shall attempt questions on vocabulary as directed. (e.g. framing sentences of their own or giving various forms of the given words, synonyms, antonyms, one-word substitutes). The students shall answer any fifteen out of the given twenty words. (15)

Q.6 This question will be based on grammar. It will consist of two parts:

(a) This part will be based on the use of tenses. The students shall attempt fifteen out of twenty questions. (15)

(b) This will be based on parts of the speech. The students shall attempt fifteen out of twenty questions. (15)

Q.7 The students shall write one paragraph (in about 200 words) on any one of the four topics given. (15)

Prescribed Texts

1. Fragrances(A Poetry Anthology) edited by Dinesh Kumar, Sunita, Sirona, and S.S. Rehal
2. A Textbook of English Grammar and Composition edited by Inderjit Kumar and Sanjay Kumar.

Part-I Section I- Fragrances, 1)Soonet XVIII, 2)Know Thysey, 3)Elegy Written in a Country Churchyard, 4)The World is too Much with us.

Part-II Section II- 5) Ode on a Grecian urn, 6) My Last Duchess, 7) When You are Old, 8) Where The Mind is Without Fear

Part-III Section III- 9) The Bangle Sellers, 10) Another Woman

Section IV- 1) Grammar and Composition 2) Grammar and Pochcs Forms and Devices

Part-IV Section V- 3) Transcription, 4) Vocabulary, 5) Essay Writing.

Section VI- Objective type Questions from all Parts.

DEPARTMENT OF MUSIC AND DANCE
KURUKSHERTRA UNIVERSITY KURUKSHETRA
SYLLABUS AND COURSES OF READING
(W.E.F 2021 -22)
M.P.A. (Semester IV)
MPAE 242 English (Core)

Credits-6 **Total Marks- 150(120 + 30 I.A.)**
Course Code- MPAE 242 **Time- 3 Hours**

Course Outcomes:

1. Able to understand and interpret of One Act Play and how it is relevant to life.
2. Able to understand the literary devices like Simile, Metaphor, Symbol, Irony, Satire used in the text.
3. Able to transcribe with stress the words, translation tones, vol. email, resume writing, book reviews.
4. Will be able to understand the use of literary and linguistic jargons in literary texts

Instructions to the Paper-setter and Students:

Note: All questions are compulsory.

Q.No.1 Explanation of two paragraphs out of the given four with reference to the context. (20)

Q.No.2(a) Very short answer type text-based questions: Students will be required to answer any six out of the given eight questions in a word/phrase/sentence. (12)

b) Students will be required to attempt any two out of the given three questions based on the text in 100 words each. Short answer type questions also may not be the same as given in the exercises. (20)

Q.No.3 Long answer type question based on the text, to be answered in about 300 words on any one of the given two questions. The questions will be designed to test the candidate's critical understanding of the text. (15)

Q.No.4 (a)Writing Skills: This question, with internal choice, will be based on the topics discussed in the text-book under the title" Extended Language Skills" except "Translation". (20)

（b) Students will be required to transcribe and mark primary stress on any ten words out of the given fifteen words. (10)

(For blind candidates only) There will be a question based on vocabulary.

（c) Vocabulary exercise (any eight out of the given ten). (8)

Q.No.5 Translation: (a) Students will be required to translate one short passage from Hindi into English. (8)

（b) Students will be required to translate one short passage from English into Hindi.

(7)

（**In lieu of translation in Q.No.5.for non-Hindi speaking candidates only)**
Writing a paragraph of about 300 words on any one of the three given topic.

Prescribed Books

1 Centre Stage edited by Sunita Siroha, S.S Rehal, and Dinesh Kumar.

Part-I Section-1) Centre Stage, One Act Plays:

1) The Envoy, and Non-Textual Topics

Part-II Section-2) The Swan Song,

Section-3) The Monkey's Paw

Section-4 Non-Textual Topics

Part-III Section-5) Before Breakfast, and Non-Textual Topics

Part-IV Section-6) The Sleepwalkers and Non-Textual Topics

Section-7) Objective type Questions from all Parts

M.P.A Semester –Vth

ENGLISH (Generic Elective)
(W.E.F 2022 -23)

MPAE 352 Media and Communication Skills

Course Code:MPAE 352 **Max. Marks: 150 (120 +30 I.A.)**

Credits:6 **Time: 3 Hours**

Course Outcomes:

1. Students will be introduced to the concept of Communication.
2. Will be able to understand the role and impact of advertisements.
3. Will be able to draft scripts for electronic media.
4. Will be able to understand the impact of media on the society.

Note: (To be printed in the question paper)

1. The students are required to attempt five questions in all.
2. Question No.1 is compulsory.
3. Attempt one question from each of the 4 Units.
4. All questions carry equal marks.

Note for Paper-Setters:

1. The paper-setter will set 9 questions in all.
2. Besides question No.1, which is compulsory, a candidate shall attempt 4 questions selecting one question each from the four units, attempting five questions in all.
3. Question No. 1 shall have four short answer type questions evenly spread over all the four units. The student shall attempt all the four questions in about 150 words each.

Unit-I Introduction to Mass Communication

(i) Mass Communication and Globalization

(ii) Forms of Mass Communication

Topics for Student Presentations:

(a) Case studies on current issues Indian journalism

(b) Performing street plays

(c) Writing pamphlets and posters, etc.

Unit-II Advertisement

(i) Types of advertisements

(ii) Advertising ethics

(iii) How to create advertisements/storyboards

Topics for Student Presentations:

(a) Creating an advertisement/visualization

(b) Enacting an advertisement in a group

(c) Creating jingles and taglines

Unit-III Media Writing

(i) Scriptwriting for TV and Radio

(ii) Writing News Reports and Editorials

(iii) Editing for Print and Online Media

Topics for Student Presentations:

(a) Script writing for a TV news/panel discussion/radio programme/hosting radio programmes on community radio

(b) Writing news reports/book reviews/film reviews/TV program reviews/interviews

(c) Editing articles

(d) Writing an editorial on a topical subject

Unit-IV Introduction to Cyber Media and Social Media

(i) Types of Social Media

(ii) The Impact of Social Media

(ii) Introduction to Cyber Media

M.P.A. SEMESTER -VIth

ENGLISH (Generic Elective)
(W.E.F 2022 -23)

MPAE 362 Academic Writing and Composition

Course Code: MPAE 362 **Max. Marks: 150 (150+30 I.A.)**

Credits:6 **Time: 3 Hours**

Course Outcomes:

1. They will be able to learn academic writing.

2. They will be able to edit documents.

3. They will be able to learn use of critical thinking while writing any document.

4. They will be able to paraphrase and summarize

Note: (To be printed in the question paper)

1. The students are required to attempt five questions in all.

2. Question No.1 is compulsory.

3. Attempt one question from each of the 4 Units.

4. All questions carry equal marks.

Note for Paper-Setters:

1. The paper-setter will set 9 questions in all.

2. Besides question No.1, which is compulsory, a candidate shall attempt 4 questions selecting one question each from the four units, attempting five questions in all.

3. Question No. 1 shall have four short answer type questions evenly spread over all the four units. The student shall attempt all the four questions in about 150 words each.

Unit-I Introduction to the Writing Process

Unit-II Introduction to the Conventions of Academic Writing

Unit-III Writing in one's own words: Summarizing and Paraphrasing

Unit-IV Critical Thinking: Syntheses, Analyses, and Evaluation

Suggested Readings

1. Liz Hamp-Lyons and Ben Heasley, Study writing: A Course in Writing Skills for Academic Purposes (Cambridge: CUP, 2006).

2. Renu Gupta, A Course in Academic Writing (New Delhi: Orient BlackSwan, 2010).

3. Ilona Leki, Academic Writing: Exploring Processes and Strategies (New York: CUP, 2nd edn, 1998).

4. Gerald Graff and Cathy Birkenstein, They Say/I Say: The Moves That Matter in Academic Writing (New York: Norton, 2009).

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Semester	Papers	Course Code	Nomenclature	L+T+P	Credits	Time	External	Internal	Total Marks
Ist	Core	MPAH 111		6+0+0	6	3 Hours	120	30	150
IInd	Core	MPAH 121	-I	6+0+0	6	3 Hours	120	30	150
IIIrd	Core	MPAH 231	( )	6+0+0	6	3 Hours	120	30	150
IVTh	Core	MPAH 241	( ) -II	6+0+0	6	3 Hours	120	30	150
Vth	GE-1	MPAH 351		6+0+0	6	3 Hours	120	30	150
VIth	GE-2	MPAH 361		6+0+0	6	3 Hours	120	30	150
Total					36		720	180	900

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MPAH 111-

Hindi (Core)

क्रेडिट – 6 **कुल अंक- 150**

समय- 3 घंटे, **परीक्षा अंक – 120, आंतरिक मूल्यांकन – 30**

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MPAH 121- -1

Hindi (Core)

क्रेडिट – 6 **कुल अंक- 150**

समय- 3 घंटे, **परीक्षा अंक – 120, आंतरिक मूल्यांकन – 30**

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MPAH 231 ( )

Hindi (Core)

क्रेडिट – 6 **कुल अंक- 150**
समय- 3 घंटे, **परीक्षा अंक – 120, आंतरिक मूल्यांकन – 30**

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MPAH 241- **( )**

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Hindi (Core)

क्रेडिट – 6 **कुल अंक- 150**

समय- 3 घंटे, **परीक्षा अंक – 120, आंतरिक मूल्यांकन – 30**

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MPAH 351

Generic Elective(GE)

क्रेडिट – 6 **कुल अंक- 150**

समय- 3 घंटे, **परीक्षा अंक – 120, आंतरिक मूल्यांकन – 30**

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MPAH 361

Generic Elective(GE)

क्रेडिट – 6 **कुल अंक- 150**

समय- 3 घंटे, **परीक्षा अंक – 120, आंतरिक मूल्यांकन – 30**

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Department of Music & Dance
Kurukshetra University, Kurukshetra
SCHEME OF EXAMINATION according to CBCS LOCF
W.E.F. 2022-23 in Phased manner

1 credit =25 marks,

1lecture = 1credit, 1Tutorial=1 credit ,2 Practical =1 credit

M.P.A. Skill Enhahcement Course (Tabla) Semester-V

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Skill Enhancement Course (SEC)	**SECT356**	Fundamentals of Tabla-1 (Theory)	2+0+0	2	3 Hours	40		10	50
Total				2		40		10	50

M.P.A. Skill Enhahcement Course (Tabla) Semester- VI

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Skill Enhancement Course (SEC)	**SECT366**	Fundamentals of Tabla-2 (Theory)	2+0+0	2	3 Hours	40		10	50
Total				2		40		10	50

Department of Music & Dance
Kurukshetra University, Kurukshetra

Syllabus and Course of reading According to CBCS LOCF
M.P.A. Semester-V
Skill Enhancement Course (SEC) Tabla
(W.E.F. 2022-23)

SECT356 Fundamentals of Tabla-1 (Theory)									
skill	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
Skill Enhancement Course (SEC)	**SECT356**	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Knowledge of basic musical terminology.**								
2.	**To Recognize basic parts & syllables of tabla.**								
3.	**Knowledge of Laya & Swar**								
4.	**Capacity to understand taal & notation.**								

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. Question number one is compulsory which must be objective type. All questions carry equal marks.

UNIT- I

(A) Definitions of following terms:

Taal, Laya, Matra, Theka, Sam, Taali, Khali, Avartan, Chinha, , Vibhaag

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UNIT-II

(A) Describe the different Parts of Tabla with Diagram

(B) Brief study of 10 Varna of Tabla

UNIT-III

(A) Relationship between Laya and Laykari.

(B) Tuning of Tabla.

UNIT-IV

A) Detailed Description of Teen taal, Kaharawa Taal, Ektaal and Sooltaal with thaah, dugun and chaugun.

B) Knowledge of Bhatkhande's Taal Notation system.

Department of Music & Dance
Kurukshetra University, Kurukshetra

Syllabus and Course of reading According to CBCS LOCF
M.P.A. Semester-VI
Skill Enhancement Course (SEC) Tabla
(W.E.F. 2022-23)

SECT 366 Fundamentals of Tabla-2 (Theory)									
Skill Enhancement Course (SEC)	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
	SECT 366	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Knowledge of musical terms.**								
2.	**Knowledge of basic taal & Bol.**								
3.	**Knowledge of indian instruments.**								
4.	**Role of table in Indian music.**								

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. Question number one is compulsory which must have objective questions. All questions carry equal marks.

UNIT-1

(A) Introduction of Naad.
(B) Definition of following term: Swar, Saptak, Alankar.

UNIT-II

(A) Detailed description of Rupak Taal, Dadra Taal, Dipchandi Taal and Chaartaal,Tivra.
(B) Brief study of following terms: Khule Bole, Band Bole

UNIT-III

(A) Classification of Indian instruments.
(B) Pakhawaj, Dholak

UNIT-IV

(A) Role of Tabla in modern Indian music.
(B) Characteristics of Tabla Accompanist.

Books Recommended

1. Tabla Vadan kala Evam Shastra- Pt. Sudhir Mainkar.
2. Taal Kosh- Girish Chandra Shrivastava.
3. Taal Parichay – Girish Chandra Shrivastava.
4. Tabla Puran – Vijay Shankar Mishra.

Department of Music & Dance
Kurukshetra University, Kurukshetra
Skill Enhancement Course(SEC) Harmonium
Scheme & Credits According to CBCS in the Course Structure
(W.E.F 2022-23)

1 credit =25 marks
1lecture = 1credit, 1Tutorial=1 credit ,2 practical =1 credit

M.P.A. Vth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Skill Enhancement course	SECH 352	Basic Principles and Techniques of Playing Harmonium-I. (Theory)	2+0+0	2	3 Hours	40		10	50
Total				2		40		10	50

M.P.A. VIth Semester

Papers Category	Code	Nomenclature	L+T+P	Credits	Time	Marks External		Internal	Total Marks
						Theory	Practical		
Skill Enhancement course	SECH 362	Basic Principles and Techniques of Playing Harmonium-II. (Theory)	2+0+0	2	3 Hours	40		10	50
Total				2		40		10	50

Department of Music & Dance
Kurukshetra University, Kurukshetra

Syllabus and Course of reading According to CBCS LOCF
M.P.A. Semester-Vth
Skill Enhancement Course (SEC) Harmonium
(W.E.F. 2022-23)

SECH356 Basic Principles and Techniques of Playing Harmonium-I (Theory)									
skill	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Hours**	**Lecture**	**Tutorial**	**Practical**
Skill Enhancement Course (SEC)	**SECH352**	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Imparts Knowledge about various parts and historical development of Harmonium**								
2.	**Ability to play Basic alankars on Harmonium with different Talas**								
3.	**Ability to play various composition on Harmonium**								
4.	**Improves ability to Accompaniment with Tabla.**								

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. Question number one is compulsory which must be objective type. All questions carry equal marks.

Unit –I

1. Structural knowledge of Harmonium with a sketch
2. Detailed history of Harmonium and its development in Indian music

Unit II

1.Ten basic Alankars in Shuddha swaras .

2 Ability to Play Harmonium with following Talas and ability to write the Thekas with dugun Layakaries in the following Taals.

(1) Dadra , (2) Kaharwa , 3. Teen Taal

Unit -III

1.Ability to write notation and playing National Anthem on Harmonium.

2.One dhun on Harmonium.

3.Ability to write notation and playing two drut Khyal with aalaps and taans of following ragas 1. Bhupali 2. Yaman

Unit -IV

. 1. Importance of Harmonium in Indian Classical Music music.

2.One Nagma in each of the following talas

Department of Music & Dance
Kurukshetra University, Kurukshetra

Syllabus and Course of reading According to CBCS LOCF
M.P.A. Semester-VIth
Skill Enhancement Course (SEC) Harmonium
(W.E.F. 2022-23)

SECH356 Basic Principles and Techniques of Playing Harmonium-II (Theory)									
Course	**Code**	**Credits**	**Total Marks**	**External Marks**	**Internal Marks**	**Time**	**Lecture**	**Tutorial**	**Practical**
Skill Enhancement Course (SEC)	**SECH352**	**2**	**50**	**40**	**10**	**3 Hours**	**2**	**0**	**0**
	Course Outcomes								
1.	**Imparts Knowledge about various types of Harmonium and Its importance in Haryanvi folk music**								
2.	**Ability to play Basic alankars on Harmonium with different Talas**								
3.	**Ability to play various composition on Harmonium**								
4.	**Improves capability to Accompaniment with Tabla and Vocal forms**								

NOTE: There shall be Nine Questions in all. The candidate shall be required to attempt five questions, selecting at least one question from each section. Question number one is compulsory which must be objective type. All questions carry equal marks.

Unit –I

1.Description of different types of Harmoinium.

2. Importance of Harmonium in Haryanvi folk music.

Unit II

1. Ten basic Alankars in Vikrit swaras
2. Ability to Play Harmonium with following Talas and ability to write the Thekas with dugun Layakaries in the following Taals.
   (1) Ek Taal , (2)Jhap Taal ,(3) Rupak

Unit -III

1. Ability to write notation playing National song on Harmonium.

2.One dhun on Harmonium and ability to write notation

3.Ability to write notation and playing two drut Khyal with aalaps and taans of Following ragas

1. Bhairavi 2. Kafi

Unit -IV

1.One Nagma in each of the following talas

(1)Ek Taal , (2)Jhap Taal ,(3) Rupak

2. Ability to accompaniment with Light vocal or folk Music.

Kurukshetra University, Kurukshetra
(Established by the State Legislature Act XII of 1956)
('A^{+}' Grade, NAAC Accredited)

(Perform Actions while Steadfasting in the State of Yoga)

DEPARTMENT OF CHEMISTRY
(DOCHEM)

CBCS CURRICULUM (2020-21)
M.Sc. Chemistry

(For the Batches Admitted From 2020-2021)

OUTCOME BASED EDUCATION SYSTEM /
LEARNING OUTCOME CURRICULUM FRAMEWORK

OBES / LOCF, CBCS CURRICULUM (2020-21)

M. Sc. Chemistry
(For the Batches Admitted From 2020-2021)

VISION

Be globally acknowledged as a distinguished centre of academic excellence.

MISSION

To prepare a class of proficient students, scholars and professionals with human values and commitment to expand the frontiers of knowledge for the advancement of society.

DEPARTMENT VISION AND MISSION

VISION

To provide competitively trained young minds to contribute as efficient teachers, chemists, researchers and assist chemical based industries and stakeholders globally.

MISSION

1. To develop researchers, scientists and educators in chemical sciences
2. To develop competent manpower for industries and business houses which are based on experimental methodologies and practices of Chemistry.
3. To provide student centric learning facilities for the development of the overall personality of the learner.

Mapping of University Vision and Mission to Department Vision and Mission

Acclaimed as Modal Centre of Learning and Research by

University Vision and Mission	Department Vision and Mission
High quality knowledge delivery through state of art infrastructure and ethical values to the students	**Yes**
Students excellence will make them professionals and innovators emerging as global leaders	**Yes**
Research and development will help in furtherance of Faculty knowledge	**Yes**

Program Outcomes (PO) for Post Graduate Programmes (CBCS) in the Faculty of Sciences, Kurukshetra University, Kurukshetra

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study.
PO2	Research Aptitude	Capability to ask relevant/ appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis.
PO3	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large.
PO4	Problem Solving	Capability of applying knowledge to solve scientific and other problems.
PO5	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, multidisciplinary settings.
PO6	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PO7	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices.

PO8	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices.
PO9	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life.
PO10	Ethics	Capability to identify and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work.
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects.

Programme Educational Objectives (PEOs):

The Department of Chemistry has formulated the Programme Educational Objectives (PEO's) with those in fields. The program educational objectives (PEO) are the statement that describes the career and professional achievement after receiving the degree. The PEO's of the Master's degree in Chemistry are as follows:

PEO1: To have fundamental as well as advanced knowledge of the chemistry domain.

PEO2: To provide the professional services to industries, Research organization, in the domain of super specialization.

PEO3: To opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner.

Program Specific Outcomes (PSO's): The program outcomes (PSO) are the statement of competencies/ abilities. PSOs are the statement that describes the knowledge and the abilities the post-graduate will have by the end of program studies.

PSO1: The detailed functional knowledge of theoretical concepts and experimental aspects of chemistry.

PSO2: To integrate the gained knowledge with various contemporary and evolving areas in chemical sciences like analytical, synthetic, pharmaceutical etc.

PSO3: To understand, analyze, plan and implement qualitative as well as quantitative analytical synthetic and phenomenon-based problems in chemical sciences.

PSO4: Provide opportunities to excel in academics, research or Industry.

Mapping of PEO's with PO's and PSO's

S. No.	*Program Educational Objectives*	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
1	To have fundamental as well as advanced knowledge in the domain of chemistry.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2	To provide the professional services to industries, Research organization, in the domain of super specialization.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3	To opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Structure and Syllabi of
M. Sc. Chemistry (Four Semesters) Course
Under Choice Based Credit System
Outcome Based Education System /
Learning Outcome Curriculum Framework (LOCF) Pattern
(Effective from the Academic Session 2020-21)

COURSE SCHEME M.Sc. Programme: Two-year (Four semesters) under Choice Based Credit System – OBES / LOCF Pattern

SYLLABUS M.Sc. (Chemistry) Programme

Credits requirement for completion of the Programme	**:**	**100**
Credits Compulsory Courses	**:**	**51**
Credits Elective Courses	**:**	**03**
Credits Open Elective Courses	**:**	**04**
Credits Specialisation Elective Courses	**:**	**40**
Credits Seminar	**:**	**02**
Credits Total	**:**	**100**

Semester-wise distribution of Credits -

Semester I	**:**	**24 (CT-12, ET-3, CP-9)**
Semester II	**:**	**23 (CT-12, OE-2, CP-9= 23)**
Semester III	**:**	**27 (CT-9, OE-2, SET-8, SEP-8)**
Semester IV	**:**	**26 (SET-16, SEP-8, SEMINAR-2)**

CT : Compulsory Theory
ET : Elective Theory
CP : Compulsory Practical
OE : Open Elective
SET : Specialisation Elective Theory
SEP : Specialisation Elective Practical

SEMESTER - I

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
CHEM 101	Inorganic Chemistry-I	CT	4	4	20	60	80	**3 Hrs.**
CHEM 102	Physical Chemistry-I	CT	4	4	20	60	80	**3 Hrs.**
CHEM 103	Organic Chemistry-I	CT	4	4	20	60	80	**3 Hrs.**
CHEM 104a	Mathematics for Chemists	ET	3	3	15	45	60	**3 Hrs.**
CHEM 104b	Chemistry of Life Science	ET	3	3	15	45	60	**3 Hrs.**
CHEM 104c	Introduction to pharmacy and pharmacology	ET	3	3	15	45	60	**3 Hrs.**
CHEM 105	Inorganic Chemistry Practical-I	CP	3	6	15	45	60	**6 Hrs.**
CHEM 106	Physical Chemistry Practical-I	CP	3	6	15	45	60	**6 Hrs.**
CHEM 107	Organic Chemistry Practical-I	CP	3	6	15	45	60	**6 Hrs.**
Total Credits/Marks			**24**	**33 (T-15, P-18)**			**480**	

CT = Compulsory Theory, CP = Compulsory Practical, ET =Elective Theory, Student has to opt any one of the elective theory paper (ET) based upon the course in B.Sc.

SEMESTER - II

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
CHEM 201	Inorganic Chemistry-II	CT	4	4	20	60	80	**3 Hrs.**
CHEM 202	Physical Chemistry-II	CT	4	4	20	60	80	**3 Hrs.**
CHEM 203	Organic Chemistry-II	CT	4	4	20	60	80	**3 Hrs.**
OE-201	OPEN ELECTIVE	OE	2	2	15	35	50	**2 Hrs.**
CHEM 204	Inorganic Chemistry Practical-II	CP	3	6	15	45	60	**6 Hrs.**
CHEM 205	Physical Chemistry Practical-II	CP	3	6	15	45	60	**6 Hrs.**
CHEM 206	Organic Chemistry Practical-II	CP	3	6	15	45	60	**6 Hrs.**
Total Credits/Marks			**23**	**32 (T-14, P-18)**			**470**	

OE = Open elective, Students of Chemistry department will study one open elective paper offered by other department from among the department of physical sciences and students of other department (s) of physical sciences may opt open elective paper (OE-201)offered by Chemistry department.

SEMESTER - III

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
CHEM 301	Inorganic Chemistry General	CT	3	3	15	45	60	**3 Hrs.**
CHEM 302	Physical Chemistry General	CT	3	3	15	45	60	**3 Hrs.**
CHEM 303	Organic Chemistry General	CT	3	3	15	45	60	**3 Hrs.**
OE-301	OPEN ELECTIVE	OE	2	2	15	35	50	**2 Hrs.**
CHEM 304	Inorganic Chemistry Special-I	SET	4	4	20	60	80	**3 Hrs.**
CHEM 305	Inorganic Chemistry Special-II	SET	4	4	20	60	80	**3 Hrs.**
CHEM 304	Physical Chemistry Special-I	SET	4	4	20	60	80	**3 Hrs.**
CHEM 305	Physical Chemistry Special-II	SET	4	4	20	60	80	**3 Hrs.**
CHEM 304	Organic Chemistry Special-I	SET	4	4	20	60	80	**3 Hrs.**
CHEM 305	Organic Chemistry Special-II	SET	4	4	20	60	80	**3 Hrs.**
CHEM 304	Pharmaceutical Chemistry Special-I	SET	4	4	20	60	80	**3 Hrs.**
CHEM 305	Pharmaceutical Chemistry Special-II	SET	4	4	20	60	80	**3 Hrs.**
CHEM 306	Inorganic Chemistry Special Practical-I	SEP	4	8	20	60	80	**6 Hrs.**

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
CHEM 307	Inorganic Chemistry Special Practical-II	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 306	Physical Chemistry Special Practical-I	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 307	Physical Chemistry Special Practical-II	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 306	Organic Chemistry Special Practical-I	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 307	Organic Chemistry Special Practical-II	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 306	Pharmaceutical Chemistry Special Practical-I	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 307	Pharmaceutical Chemistry Special Practical-II	SEP	4	8	20	60	80	**6 Hrs.**
Total Credits/Marks			**27**	**(83)T-35, P-48**			**550**	

SET=Specialization elective theory, SEP=Specialization elective theory (Student has to opt all three CT, One OE offered by other departments from among the physical sciences and any two SET and two SEP from the same specialization)

SEMESTER - IV

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
CHEM 401	Inorganic Chemistry Special-III	SET	4	4	20	60	80	**3 Hrs.**
CHEM 402	Inorganic Chemistry Special-IV	SET	4	4	20	60	80	**3 Hrs.**
CHEM 403	Inorganic Chemistry Special-V	SET	4	4	20	60	80	**3 Hrs.**
CHEM 404	Inorganic Chemistry Special-VI	SET	4	4	20	60	80	**3 Hrs.**
CHEM 401	Physical Chemistry Special-III	SET	4	4	20	60	80	**3 Hrs.**
CHEM 402	Physical Chemistry Special-IV	SET	4	4	20	60	80	**3 Hrs.**
CHEM 403	Physical Chemistry Special-V	SET	4	4	20	60	80	**3 Hrs.**
CHEM 404	Physical Chemistry Special-VI	SET	4	4	20	60	80	**3 Hrs.**
CHEM 401	Organic Chemistry Special-III	SET	4	4	20	60	80	**3 Hrs.**
CHEM 402	Organic Chemistry Special-IV	SET	4	4	20	60	80	**3 Hrs.**
CHEM 403	Organic Chemistry Special-V	SET	4	4	20	60	80	**3 Hrs.**
CHEM 404	Organic Chemistry Special-VI	SET	4	4	20	60	80	**3 Hrs.**
CHEM 401	Pharmaceutical Chemistry Special-III	SET	4	4	20	60	80	**3 Hrs.**

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
CHEM 402	Pharmaceutical Chemistry Special-IV	SET	4	4	20	60	80	**3 Hrs.**
CHEM 403	Pharmaceutical Chemistry Special-V	SET	4	4	20	60	80	**3 Hrs.**
CHEM 404	Pharmaceutical Chemistry Special-VI	SET	4	4	20	60	80	**3 Hrs.**
CHEM 405	Inorganic Chemistry Special Practical-III	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 406	Inorganic Chemistry Special Practical-IV	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 405	Physical Chemistry Special Practical-III	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 406	Physical Chemistry Special Practical-IV	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 405	Organic Chemistry Special Practical-III	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 406	Organic Chemistry Special Practical-IV	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 405	Pharmaceutical Chemistry Special Practical-III	SEP	4	8	20	60	80	**6 Hrs.**
CHEM 406	Pharmaceutical Chemistry Special Practical-IV	SEP	4	8	20	60	80	**6 Hrs.**

Course Code	Course Title		Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
					Internal Assess-ment*	End-semester Exam-ination	Total	
	Seminar*	C	2				20	
Total Credits/Marks			**26**	**96 (T-48,P-48)**			**500**	

Student has to opt four SET and Two SEP from same specialization and every student has to deliver one seminar on the topic assigned by the seminar committee.

***2 credits per specialization, Student should prepare and submit a seminar report, typed by computer using chemistry software on the topic as assigned by seminar committee.**

Open Elective Papers

For the Students of M.Sc. Chemistry

A student will earn four credits by choosing any two papers out of the open elective papers offered by the departments in the faculty of sciences other than the department of Chemistry.

Course Code	Course Title	Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
				Internal Assess-ment*	End-semester Exam-ination	Total	
OE*	Open Elective Paper -01	2	2	15	35	50	**2 Hrs.**
OE*	Open Elective Paper -02	2	2	15	35	50	**2 Hrs.**
Total Credits/Marks		**04**				**100**	

For the Students of Other Departments in the Faculty of Science

The Department of Chemistry offers the following open elective papers to the students of second and third semesters of other departments in the faculty of sciences.

Course Code	Course Title	Credits	Teaching Hours per week	Maximum Marks			Duration of Exam.
				Internal Assess-ment*	End-semester Exam-ination	Total	
OE-201	Environmental & Analytical Chemistry	2	2	15	35	50	**2 Hrs.**
OE-301	Applied Chemistry	2	2	15	35	50	**2 Hrs.**
Total Credits/Marks		**04**				**100**	

***code will be provided by the respective department, opted by the student.**

Total Marks of all Four Semesters

Semester	Credits	Marks
Semester I	24	480
Semester II	23	470
Semester III	27	550
Semester IV	26	500
Grand Total	100	2000

Internal Assessment in theory papers will be made on the basis of sessional test (s) and other parameters as decided by the University from time to time, while in Laboratory papers it will be decided from continuous assessment in internal viva-voce examination of all the experiments performed. Current guidelines for determining Internal Assessment in theory papers are given as Annexure 1.

Each student will deliver one seminar of about 40 minutes duration on the topic to be allotted by the departmental seminar committee in the 4th Semester of the M.Sc. Chemistry Course as per the schedule given by the department. The marks will be awarded by the seminar committee on the basis of performance in the seminar and the seminar report submitted by the student.

The special papers will be allotted to students on the basis of their preference-cum-merit (percentage of marks in the First Semester examination of M.Sc. Chemistry) basis.

General objectives of the course

Chemistry is the science of matter; the branch of the natural sciences dealing with the composition of substances, their properties and reactions. Chemistry is involved in almost everything with which we come in contact. The life processes of all organisms involve chemical changes. Chemistry enables the development of drugs to cure and alleviate diseases and prolong life span. It also connects the fundamental principles of physics to the other natural sciences - biology, botany, medicine, geology, ecology- in short, to the life sciences and the earth sciences. It is an experimental science and students need to be trained in practicals to get expertise in doing fine experiments and handle sophisticated instruments and statistically analyse the experimental data.

Master of Science (M.Sc.) in Chemistry is the oldest **(1961)** post graduation course of University of Kurukshetra. The Curriculum is so designed that it offers four specializations to the M.Sc. Chemistry students, which includes Physical, Organic, Inorganic and Pharmaceutical Chemistry.

Through this curriculum, a choice based credit system (CBCS) is being implemented for all round development of the students, giving a fair weightage to their interest. It would allow the students to develop their abilities in the disciplines of their own interest. The students pursuing this course will develop in depth understanding of various aspects of the subject. The conceptual understanding of structure and behaviour of elements (atoms), energy changes associated with the reactions, principles and rules that unite these phenomenon in to comprehensive system, development of experimental skills, designing and implementation of novel synthetic methods, developing the aptitude for academic and professional skills, acquiring basic concepts for structural elucidation with hyphenated techniques, understanding the fundamental biological processes and rationale towards computer assisted drug designing are among such important aspects. This curriculum has an immense potential for chemistry and post graduate students to develop as a good chemistry teacher or as skilled chemists to undertake advanced research in laboratory or in Industry.

M.Sc. Chemistry Semester-I
Inorganic Chemistry-I (CHEM-101)

Credits-4 **Total Marks = 80**
Time: 3 Hrs **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Symmetry and Group Theory in Chemistry

Definitions of group, subgroup, relation between orders of a finite groups and its subgroups. Conjugacy relation and classes. Symmetry elements and symmetry operations, Point symmetry group. Schönflies symbols, representations of groups by matrices (representation for the C_n, C_{nv}, C_{nh}, D_{nh} etc. groups to be worked out explicitly). Character of a representation, reducible and irreducible representations. The great orthogonality theorem (without proof) and its importance, Derivation of character tables of C_{2v}, C_{3v} and D_{2h} Character tables and their use. Molecular asymmetry, dissymmetry and optical activity.

SECTION – B

Stereochemistry and Bonding in Main Group Compounds.

VSEPR Theory, Walsh diagrams (tri-atomic molecules), $d\pi$-$p\pi$ bonds, Bent rule and energetic of hybridization, Huckel theory with reference to ethylene and butadiene, Some simple substitution reactions of covalently bonded molecules of boron, silicon and nitrogen.

SECTION – C

Metal-Ligand Equilibria in Solution

Stepwise and overall formation constants and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin, determination of binary formation constants by pH-metry and spectrophotometry.

Substitution reactions in octahedral complexes, theories of trans effect with respect to Pt(II) complexes. Brief account of electron transfer reactions, inert and labile complexes.

SECTION – D

Metal-Ligand Bonding

Crystal field theory and its limitation , crystal field effects, John Teller distortion, nephelauxetic series, spin-orbital coupling, molecular orbital theory

of octahedral, tetrahedral and square planar complexes (with and without π - bonding).

Course Outcomes:

CO1 Describe advanced symmetry concepts of chemical molecules and its applications.

CO2 To identify the axis, plane, center and point group, polarity, dipole moment, product of symmetry operation and character table of chemical compounds.

CO3 Describe the bonding and stereochemistry in covalent compounds, characterstics of bonding in covalent compounds viz. Bent's rule, walsh diagrams, dπ-pπ bonding.

CO4 To discuss the substitution reactions of covalently bonded molecules boron, silicon and nitrogen.

CO5 To know about the metal equilibria in solutions.

CO6 To describe the factors affecting stability of metal ligand complexes.

CO7 To use the various methods for the determination of stability constant.

CO8 To know about the substitution reactions in square planar complexes with special reference to trans effect.

CO9 Know about the limitations of crystal field theory and its effects in coordination complexes.

CO10 To apply the concept of molecular orbital theory to tetrahedral square planar and octahedral complexes.

Mapping of Paper No. CHEM 101

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	W	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	W	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	W	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	W	S	S	S	M	S
CO5	S	S	S	S	S	M	S	S	M	S	S	S	S	S	S
CO6	S	S	S	S	S	M	S	S	S	M	S	S	S	S	M
CO7	S	S	S	S	s	S	M	S	M	M	S	S	S	S	M
CO8	S	S	S	S	s	S	M	S	S	W	M	S	S	S	S
CO9	S	S	S	S	S	S	S	M	S	M	S	S	S	S	S
CO10	S	S	S	S	S	S	S	M	S	M	S	S	S	M	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harper & Row.
3. Chemical Applications of Group Theory; F.A. Cotton, Wiley, New York.
4. Chemistry of the Elements, N.N. Greenwood and A. Earnshaw, Pergamon.
5. The Chemical bond; J.N.Murrel, SFA Kettle and J.M. Tedder; Wiley, New York.
6. Modern Aspects of Inorganic Chemistry; H. J. Emeleus and Sharpe.
7. Concepts and Models of Inorganic Chemistry; B. Douglas, D.H. McDaniel and J. J. Alexander; John Wiley and Sons.
8. Inorganic Chemistry, A Modern Introduction; T Moeller, John Wiley and Sons.

M.Sc. Chemistry Semester-I
Physical Chemistry-I (CHEM-102)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – A

Partial Molar Properties

Recapitulation of thermodynamic laws, Partial molar quantities, chemical potential and Gibbs-Duhem equation, variation of chemical potential with temperature and pressure, chemical potential for an ideal gas, chemical potential of ideal gas mixture(s), determination of partial molar volume, thermodynamic functions of mixing (free energy, entropy, volume and enthalpy), concept of escaping tendency and chemical potential.

Real Gases: Concept of Fugacity and Activity

Concept of fugacity, methods for determining the fugacity of a real gas, its variation with temperature and pressure, activity, choice of standard states, dependence of activity on temperature and pressure, determination of activity by (i) measurement of vapour pressure, (ii) distribution of solute between two immiscible solvents and (iii) emf measurement.

SECTION – B

Chemical Kinetics

Collision theory of reaction rates, the steric requirement, Arrhenius equation and activated complex theory (ACT), Equilibrium hypothesis, Statistical mechanics and Chemical Equilibrium, Comparison of Collision and Activation complex theory, Potential energy surfaces (Only basic Idea), Thermodynamic formulation of activated complex theory, Chain reactions (hydrogen-halogen reaction), Unimolecular reactions: Lindemann-Christiansen Hypothesis, Hishelwood treatment.

SECTION – C

Electrochemistry

Debye-Hückel theory of ion-ion interaction and activity coefficient, applicability and limitations of Debye-Hückel limiting law, its modification for finite-sized ions, effect of ion-solvent interaction on activity coefficient. Physical significance of activity coefficients, mean activity coefficient of an electrolyte.

Debye-Huckel-Onsager (D-H-O) theory of electrolytic conductance, Debye-Falkenhagen effect, Wein effect. D-H-O equation - its applicability and

limitations, Pair-wise association of ions (Bjerrum treatment), Modification of D-H-O theory to account for ion-pair formation.

Metal/Electrolyte interface, Concept of electrical double layer and its structure: Helmholtz-Perrin, Gouy-Chapman, and Stern models, electrokinetic phenomena, determination of zeta potential.

SECTION-D

Surface Chemistry and Catalysis

Gibbs adsorption equation, Langmuir adsorption isotherm and its derivation for non-dissociative and dissociative adsorption, BET adsorption isotherm, its derivation and applications.

Study of surfaces by STM, SEM. Heterogeneous catalysis, surface heterogeneity, surface catalyzed unimolecular and bimolecular reactions, temporary and permanent catalytic poisons, activation energy for surface reactions. Comparison of uncatalyzed and catalyzed reaction rates.

Course Outcomes:

CO1 Recapitulation of thermodynamic laws, concept of fugacity and its determination.

CO2 Concept of activity and its determination using emf measurement, vapour pressure method and some other methods.

CO3 To know about Partial molar quantities, chemical potential and Gibbs-Duhem equation and its variation with temperature and pressure.

CO4 To explain thermodynamic functions of mixing (free energy, entropy, volume and enthalpy), concept of escaping tendency and chemical potential.

CO5 To describe the concept of potential energy surfaces.

CO6 To explain Collision theory of reaction rates, steric requirement, Arrhenius equation and activated complex theory (ACT).

CO7 To demonstrate thermodynamic formulations of activated complex theory.

CO8 To explain Lindemann-Christiansen and Hinshelwood mechanisms of unimolecular reactions.

CO9 To discuss Debye-Hückel theory of ion-ion interaction and activity coefficient, its applicability, limitations and its modification for finite-sized ions, effect of ion-solvent interaction on activity coefficient.

CO10 Able to derive D-H-O equation - its applicability and limitations, Pair-wise association of ions (Bjerrum treatment)and its modifications for ion-pair formation.

CO11 To know the Concept of electrical double layer and its structure.

CO12 To know about Helmholtz-Perrin, Gouy-Chapman, and Stern models, electrokinetic phenomena and the determination of zeta potential.

CO13 To discuss the Langmuir adsorption isotherm and its kinetic derivation for non- dissociative and dissociative adsorption.

CO14 To know about surface catalyzed unimolecular and bimolecular reactions, temporary and permanent catalytic poisons.

CO15 To carry out a comparison between homogeneous and heterogeneous reaction rates.

Mapping of Paper No. CHEM 102

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	M	S	S	M	S	M	W	M	S	S	M	M	S	M
CO6	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO7	S	S	S	S	M	M	S	M	S	S	S	M	M	M	M
CO8	S	M	S	M	S	M	M	W	M	S	M	S	M	M	M
CO9	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S
CO10	S	S	S	S	S	S	M	S	S	S	S	S	M	S	S
CO11	S	M	S	S	S	M	M	M	S	S	M	S	M	M	M
CO12	S	M	W	M	M	S	M	M	M	M	M	S	W	M	M
CO13	S	S	S	S	S	S	M	M	S	S	M	M	M	S	S
CO14	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO15	S	S	S	S	S	S	M	S	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. An Introduction to Chemical Thermodynamics, R.P. Rastogi and R.R. Misra, Vikas Pub.
2. Physical Chemistry, P.W. Atkins, Oxford University Press.
3. Thermodynamics for Chemists, S. Glasstone, Affiliated East-West Press.
4. Thermodynamics, I.M. Klotz and R.M. Rosenbers, Benzamin.
5. Chemical Kinetics, K.J. Laidler, McGraw Hill.

6. Kinetics and Mechanism, A. A. Frost and R.G. Pearson, John Wiley and Sons.
7. Electrochemistry, S. Glasstone, Affiliated East-West Press.
8. Physical Chemistry, G.W. Castellan, Narosa.
9. Heterogeneous Catalysis: Fundamentals and Applications, Julian R.H. Ross, Wiley-VCH; 2nd, Revised and Enlarged Edition edition (October 1, 2007).
10. Concepts of Modern Catalysis and Kinetics, I. Chorkendorff and J. W. Niemantsverdriet.

M.Sc. Chemistry Semester I
Organic Chemistry-I (CHEM-103)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – A

Reaction Mechanism: Structure and Reactivity

Types of mechanisms, types of reactions, thermodynamic and kinetic requirements, effect of structure on reactivity - resonance and field effects, steric effect, quantitative treatment-The Hammett equation and linear free energy relationship, substituent and reaction constants and Taft equation. Kinetic and thermodynamic control, Hammond's postulate, Curtin-Hammett principle. Potential energy diagrams, transition states and intermediates, methods of determining reaction mechanisms. Generation, structure, stability and reactivity of carbocations, carbanions, carbenes and nitrenes.

SECTION – B

Mechanism of Nucleophilic Aliphatic Substitution

The limiting cases SN^1 and SN^2, detailed mechanistic description and borderline mechanisms, nucleophilicity and solvent effects, competition between nucleophilicity and basicity, ambident nucleophiles, hard and soft nucleophiles and electrophiles, leaving group effects, steric and other substituent effects on substitution and ionization rates, stereochemistry of nucleophilic substitution. SN^i, $SN^{1'}$, $SN^{2'}$ and $SN^{i'}$ mechanisms.

Mechanism of Elimination Reactions

The El, ElcB and E2 mechanisms, Orientation Effects in Elimination Reactions, Saytzeff and Hoffman rules, Stereochemistry of E2 Elimination Reaction and Eclipsing Effects in E2 Eliminations. Dehydration of Alcohols, Elimination not involving C-H Bonds, Pyrolytic eliminations.

SECTION – C

Stereochemistry-I

Symmetry elements, D-L, R-S, E-Z and threo-erythro nomenclature, interconversion of Fischer, Newman, Sawhorse and flying wedge formulae. conformational analysis, enantiomerism and diastereomerism of simple, cyclic (chair and boat configuration) and acyclic systems. Axial and planer chirality, optical isomerism in allenes, biphenyls (atropoisomerism), spiranes,

hemispiranes. Elementary ideas about stereochemistry of tertiary amines, quaternary salts, sulphur and phosphorous compounds.

SECTION - D

Stereochemistry –II

Topicity of ligands and faces, their nomenclature and prostereoisomerism, stereogenecity, chirogenicity, pseudoasymmetry and prochiral centre. stereospecific and stereoselective reaction.Elementary idea of principle categories of asymmetric synthesis, Cram's rule and its modification, Prelog rule and horeaus rule. Stereochemistry of sugars- C1 and 1C conformations of hexoses, c_2'-endo and c_3'-endo conformation of pentoses, homomorphous sugars, abnormal mutarotation and Δ-2 instability factor. Stereochemistry of decalins,

Chemical correlation of configuration-determination of relative configuration of 2-butanol, isoserine, alanine, malic acid, lactic acid and mandelic acid.

Course Outcomes:

CO1 Describe reaction intermediates, energy profile diagrams and establish mechanism of organic reaction simultaneously understand effect of structure on reactivity and application of Hammett /Taft equations, Curtin-Hammett principles, Hammond postulates in theoretical treatment of organic reactions.

CO2 Understand mechanistic details of different types of and factors affecting aliphatic nucleophilic substitution reactions and the terminology involved therein.

CO3 Know mechanistic details of different types of elimination reactions, Saytzeff and Hoffman rules and application of these in prediction of product formation in various elimination reactions.

CO4 Master stereo-chemical terms, inter-convert stereo-structural formulae of organic molecules, analyze configurations, create stereo-structures and correlate configuration by applying the concept of chemical correlation.

CO5 Realize the concepts of prochirality, topicity related terms, asymmetric synthesis, its main categories vis-à-vis application of Cram's, Prelog and Horeaus rule.

CO6 Describe stability of different configurations and conformations of acyclic and cyclic organic compounds, sugars, decalins.

Mapping of Paper No. CHEM 103

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	--	--	S	--	S	S	S	S	S
CO2	S	S	S	S	S	S	--	M	S	--	S	S	S	S	S
CO3	S	S	S	S	S	S	--	--	S	--	S	S	S	S	S
CO4	S	S	S	S	S	S	--	M	S	--	S	S	S	S	S
CO5	S	S	S	S	S	S	--	M	S	--	S	S	S	S	S
CO6	S	S	S	S	S	S	--	M	S	--	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Advanced Organic Chemistry Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Plenum.
3. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
4. Structure and Mechanism in Organic Chemistry, C. K. Ingold, Cornell University Press.
5. Organic Chemistry, R. T. Morrison and R. N. Boyd, Prentice-Hall.
6. Modern Organic Reactions, H. O. House, Benjamin.
7. Principles of Organic Synthesis, R. O. C. Norman and J. M. Coxon, Blackie Academic & Professional.
8. Reaction Mechanism in Organic Chemistry, S. M. Mukherji and S. P. Singh, Macmillan.
9. Stereochemistry of Organic Compounds, D. Nasipuri, New Age International.
10. Stereochemistry of Organic Compounds, P.S, Kalsi, New Age International.
11. Stereochemistry of Organic compounds, E.L. Elien, Mc Graw Hills, 1962.

M.Sc. Chemistry Semester I
Mathematics for Chemists (CHEM 104A)

Credits-3 **Total Marks = 60**
Time: 3 Hrs. **45 (EM) + 15 (IA)**

Note: Seven questions will be set; Question 1 will be compulsory covering all the sections. Two questions will be set from each section. The candidates are required to attempt five questions selecting at least one question from each section and compulsory question. All questions carry equal marks.

SECTION - A

Vectors

Examples of scalar and vectors, definitions of vectors in two, three spaces, representation and simple properties of vectors, addition and subtraction of vectors, vector addition by the method of triangles, resolution of vectors into rectangular components, addition of vectors by components, multiplication and differentiation of vectors. Scalar product of vectors, vector product, concept of normalization, orthogonality and complete set of unit vectors. Illustration of applications to spectroscopy and quantum chemistry.

Matrices and Determinants

Definition of matrix, types of matrices, viz. row matrix, column matrix, null matrix, square matrix, diagonal matrix, addition, subtraction and multiplication by a number, matrix multiplication. Transpose and adjoint of matrix, elementary transformation, representation and applications (without development of theory) to solution of linear equations. Definition of determinant, properties of determinants, evaluation of determinants. Illustration or applications to group theory, problems in chemistry.

SECTION - B

Logarithm

Need for logarithm in chemistry. Theory and application of logarithms for solving general and chemical problems.

Graphical Representation of Equations

Rectangular coordinates, straight lines, slope and intercept of the equation, slope and point equation, two point equation, parallel lines, points of intersection, distance between two points, change of origin. Examples from problems in chemistry, curve fitting for least squares method.

Elements of Algebraic and Trigonometric Functions

The binomial expansion, some example from chemistry, sines, cosines and tangents, trigonometric identities, polar coordinates in trigonometric functions.

SECTION-C

Differential Calculus

Theory, graphical significance of differentiation, rules of differentiation, Algebraic simplification, Partial differentiation, Exact and inexact differential with their application to thermodynamic principles.

Integral Calculus

Integral theory, methods of integration, viz. algebraic simplifications, integration by substitution, integration by parts, integration by partial fractions, integration between limits, curve sketching, integral as area, , Illustration of application in chemistry.

Differential Equation

Simple differential equations, separable variables, homogeneous equations, exact differential equations, linear differential equations, partial differential equations, application to physico-chemical problems.

Course Outcomes:

CO1 To explain definitions of vectors, representation and properties of vectors.

CO2 To perform vector mathematical operations.

CO3 To explain scalar and vector products of vectors.

CO4 To discuss definition and properties of matrices and determinants.

CO5 Be able to perform matrix mathematics.

CO6 To solve linear equations using matrices.

CO7 To discuss need, theory and applications of logarithms.

CO8 To execute the knowledge in solving general and chemical problems.

CO9 Be able to represent equations graphically and perform curve fitting for least squares method.

CO10 To perform binomial expansion.

CO11 To prove and apply trigometric identities and explain polar coordinates in trigonometric functions.

CO12 To explain rules of differentiation and be able to find out the derivative of a function by applying various methods of differentiation.

CO13 To perform partial differentiation.

CO14 To discuss exact and inexact differentials and their applications to chemistry.

CO15 To explain rules and methods of integration.

CO16 To perform integration between limits and its application in chemistry.

CO17 To discuss types of differential equations and their solutions with their application to physico-chemical problems.

Mapping of Paper No. CHEM-104A

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO11	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO12	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO13	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO14	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO15	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO16	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO17	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Mathematical Preparation for Physical Chemistry, F. Daniels, McGraw Hill.
2. Mathematical Preparation for General Physics, J.B. Marian, R.C. Davidson Saunder Company.
3. Mathematical Methods for Science Students, G. Stephemen, ELBS.
4. Chemical Thermodynamics, C.E. Reid, Mc Graw Hills, College 0th Edition.

Or

M.Sc. Chemistry Semester I

Chemistry of Life Science (CHEM 104B)

Credits-3 **Total Marks = 60**

Time: 3 Hrs. **45 (EM) + 15 (IA)**

Note: Seven questions will be set; Question 1 will be compulsory covering all the sections. Two questions will be set from each section. The candidates are required to attempt five questions selecting at least one question from each section and compulsory question. All questions carry equal marks.

SECTION - A

Carbohydrates

Structure and biological functions of important monosachharides (excluding detailed conformational analysis) and derivatives of monosaccharides like glycosides, deoxy sugars, myoinositol, amino sugars-N-acetylmuramic acid and sialic acid. Disaccharides- sucrose, lactose and maltose.

Structure and biological functions of Structural polysaccharides (cellulose and chitin) and Storage polysaccharides (starch and glycogen) Heteropolysaccharides-glucosaminoglycans/mucopolysaccharides.

Glycoconjugates- glycoproteins and glycolipids. Role of sugars in biological recognition. Blood group substances.

Cell Structure and Metabolism

Structure of prokaryotic and eukaryotic cells, intracellular organelles and their functions, comparison of plant and animal cells. Overview of metabolic processes - catabolism and anabolism. ATP - the biological energy currency. Carbohydrate metabolism: glycolysis and Kreb's cycle.

SECTION – B

Lipids

Fatty acids, essential fatty acids, structure and functions of triacylglycerols, glycerophospholipids, sphingolipids, cholesterol, bile acids.

Lipid aggregates-micelles, bilayers, liposomes and their possible biological functions. Biological membranes. Fluid mosaic model of membrane structure.

Lipid metabolism - β-oxidation of fatty acids.

Amino-acids, Peptides and Protein

Peptide bond, Chemical and enzymatic hydrolysis of proteins to peptides, Sanger method and Edman degradation method for amino acid sequencing. Secondary structure of proteins-α-helix, β-sheet, forces responsible for holding the secondary structures of proteins. Denaturation of Proteins.

SECTION – C

Nucleic Acids and Genetic Code

Structure and functions of nucleotides, nucleosides, DNA (Watson-Crick model, Chargaff's rules) and RNA (m RNA, r-RNA and t-RNA).

Genetic code and its characteristics, codon-anticodon pairing (Wobble hypothesis).

Replication, Transcription and Translation (Prokaryotes only)

Replication of DNA: Maselson-Stahl experiment, mechanism of replication (Initiation, Elongation and Termination).

Transcription: Promoters site, Initiation, Elongation, Termination.

Translation: Activation of amino acids, Initiation, Elongation, Termination.

Course outcomes:

CO1 To describe the prokaryotic and eukaryotic cell Structure, metabolic processes occurring in cell. Able to discuss the Carbohydrate metabolism-glycolysis, Kreb's cycle, glycogenolysis, glycogenesis pentose phosphate pathway and gluconeogenesis.

CO2 To explain the Structure and functions of important derivatives of monosaccharides like glycosides, deoxy sugars, myoinositol, structural polysaccharides - cellulose and chitin. Storage polysaccharides-starch and glycogen.

CO3 To analyze the structure and functions of fatty acids, triacylglycerols, glycerophospholipids, sphingolipids, cholesterol, bile acids. β-oxidation of fatty acid, Fluid mosaic mode of cell membrane.

CO4 To know the concept of the amino acids, peptides and proteins. Able to describe the primary, secondary structure of proteins and forces responsible for holding these structures.

CO5 To understand enzymatic and chemical cleavage of polypeptide chain, sequencing of amino acids in a polypeptide segment, Sanger method, Edman degradation method, concept of denaturation of proteins.

CO6 To explain the Structure of nucleotides, nucleosides, DNA (Watson-Crick model) RNA and their conformation.

CO7 Able to explain the DNA replication, translation and transcription.

Mapping of Paper No. CHEM-104(B)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO 1	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 6	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 7	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Principles of Biochemistry, A. L. Lehninger, Worth Publishers.
2. Biochemistry, L.Stryer, W.H.Freeman.
3. Biochemistry, J. David Rawn, Neil Patterson.
4. Biochemistry, Voet and Voet, John Wiley.
5. Outlines of Biochemistry, E. E.Conn and P. K. Stumpf, John Wiley.

Or

M.Sc. Chemistry Semester I
Introduction to Pharmacy and Pharmacology (CHEM 104C)

Credits-3 **Total Marks = 60**
Time: 3 Hrs. **45 (EM) + 15 (IA)**

Note: Seven questions will be set; Question 1 will be compulsory covering all the sections. Two questions will be set from each section. The candidates are required to attempt five questions selecting at least one question from each section and compulsory question. All questions carry equal marks.

SECTION-A

Introduction

Introduction to Pharmaceutical sciences, its branches, naming of drugs, Generic drugs, routes of drug administration, drug development and its regulation.

Introduction of pharmacopeia (IP, BP, USP), introduction of national formularies, typical parts of monograph of Indian pharmacopeia, an introduction to content of IP.

Dosage Forms-1

Solid dosage forms: Tablets-Types, granulation, compression, additives used in formulations, coating, evaluation (including dissolution, disintegration, Hardness, Friability, weight variation).

Capsules-Soft and hard gelatin capsules, microencapsulation.

SECTION-B

Dosage Forms-II

Semi solid dosage forms: Introduction, types, brief description of ointments and creams. Biphasic liquid dosage forms: Emulsions and suspensions-types, formulation, methods of preparation, stability.

Monophasic liquid dosage forms: Types, brief description of mixtures and syrups.

Sterile dosage forms and ophthalmic products.

Toxicology

Introduction, acute and chronic toxicity, LD50 and ED50, therapeutic index, adverse drug effects, dose response relationship, therapeutic drug monitoring, General principles of management of poisoning, antidotes, Treatment of heavy metal poisoning and drugs (barbiturates, benzodiazepines, salicylates, morphine & morphine derivatives, alcohol).

SECTION-C

Pharmacokinetics

Physicochemical factors in transfer of drugs across membranes, ADME (Absorption, distribution, metabolism-Phase I and Phase II reactions, Excretion) of drugs, important pharmacokinetic parameters-apparent volume of distribution, bioavailability, clearance, Half life.

Pharmacodynamics

Mechanism of drug action, drug targets, neurotransmitters and hormones, the receptor role, Drug Receptor Interactions, types of receptors, structure and functioning of ion channel receptors, G-protein coupled receptors, kinase-linked receptors.

Course outcomes:

The paper is designed to provide basic knowledge about pharmacology, naming, routes to administer, pharmacopoeias, dosage forms, toxicology, pharmacokinetics and pharmacodynamics.]

CO1 To know the naming of drugs and various routes of drug administration.

CO2 To describe different pharmacopeias (IP, BP, USP).

CO3 To tell about the solid dosage forms, tablets and capsules (soft and hard gelatin capsules).

CO4 To give the idea of Semi solid dosage forms, ointments and creams.

CO5 To make to know biphasic liquid dosage forms, Emulsions and suspensions.

CO6 To deliver the information of monophasic liquid dosage forms, their types and brief description.

CO7 To learn the sterile dosage forms and ophthalmic products.

CO8 To inform about the adverse effects of drugs including details of LD50 and ED50 and therapeutic index.

CO9 To make aware about the management of poisoning, antidotes, treatment of heavy metal poisoning and drugs.

CO10 To familiarize with pharmacokinetics (ADME) and important pharmacokinetic parameters.

CO11 To understand about pharmacodynamics, neurotransmitters, drug targets.

CO12 To discuss structure and functioning of receptor types.

Mapping of CO with PO's and PSO's Paper No. CHEM 104C

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO8	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO9	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO10	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO11	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO12	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Foye's principles of medicinal chemistry. David A. Williams, Thomas L. Lemke, Fifth Edition. Lippincott Williams & Wilkins.
2. Essentials of medicinal Pharmacology, K.D.Tripathi, 4th Edition . Jaypee Brothers Medical Publishers Ltd.
3. Medicinal chemistry Vol. I & II. A. Burger, Willey interscience, 1970
4. Pharmacology & Pharmacotherapeutics, Vol. I & II. R.S. Satoskar & S.C. Bhandarkar, Popular Prakashan 1978.
5. A Textbook of medicinal chemistry. P. Parimoo.
6. The Pharmacological Basis of Therapeutics, L.L. Brunton, J.S. Lazo, K.L. Parker 11th ed., Magraw Hill, US, (2006).
7. Goodman and Gilman's Pharmacological Basis of Therapeutics, McGraw-Hill.
8. Basic and Clinical Pharmacology, Lauge Medical Publication. 1995 B. G. Katzung.
9. Introduction to Pharmacology by P.C. Dandya and S.K. Kulkarni.
10. Cooper and Gunn's Dispensing for Pharmaceutical Students, Ed.S.J. Carter, CBS publishers & distributors.
11. Tutorial Pharmacy, Cooper and Gunn's.
12. "Theory and Practice of Industrial Pharmacy" Lea & Fabiger, L.Lachman.
13. "A textbook of Pharmaceutical Chemistry", Oxford Press, Bentley and Drivers.

M.Sc. Chemistry Semester I

Inorganic Chemistry Practical-I (CHEM 105)

Credits-3 **Total Marks = 60**

Time: 6 Hrs. (Two sessions) **45 (EM) + 15 (IA)**

1. Qualitative analysis:

Total five radicals to be given containing two less common metal ions, one insoluble and two acid radicals:, $CH_3COO^-, BO_3^{3-}, PO_4^{3-}, CO_3^{2-}, HCO_3^-, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, S^{2-}, SO_3^{2-}, SO_4^{2-}, S_2O_3^{2-}, F^-, C_2O_4^{2-}$.

Less common metal ions – W, Tl, Mo, Se, Ti, Zr, Th, V, U, Ce, Be (two metal ions in cationic and anionic forms).

Insoluble: Halides (AgCl, AgBr, AgI); Sulphates ($PbSO_4$, $BaSO_4$) and Oxides (Al_2O_3, Cr_2O_3, SnO_2, TiO_2, SiO_2)

2. Cerimetric / Iodometric/Oxidimetry titrations.

Experiment **Marks: 30**

Lab record & Viva-voce **Marks: 5+10**

Course outcomes:

CO1 To know the basic concept about the qualitative analysis.

CO2 To analyse the given mixture for the presence of two acidic radicals, two rare earth metal ions and one insoluble salt.

CO3 To know the cerimetric / Iodometric titrations.

CO4 To demonstrate the various cerimetric and iodometric titrations in laboratory.

CO5 To perform experimentation and evaluate the results.

CO6 To develop the ability to compile interpreted information in the form of lab record.

CO7 To face viva-voce.

Mapping of Paper No. CHEM-105

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	M	S	S	M	M	S	S	M	S
CO2	S	M	S	M	S	S	M	M	S	S	M	S	M	S	M
CO3	S	S	S	M	S	M	S	S	M	S	S	M	S	S	M
CO4	M	S	S	S	S	M	S	S	M	S	S	S	S	M	M
CO5	S	S	M	S	M	M	S	S	S	M	M	S	M	S	S
CO6	M	M	S	M	S	S	M	M	S	S	S	M	S	S	M
CO7	S	S	S	M	S	M	S	S	M	S	S	S	S	M	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. A Text Book of Macro and Semi-micro Quantitative Analysis, A. I. Vogel, Orient Longman.
2. A Vogel's Text Book of Quantitative Inorganic Analysis, J. Bassett, R. C. Denney, G. B. Jaffery and J. Menaham, Longman, London.

M.Sc. Chemistry Semester I
Physical Chemistry Practical-I (CHEM 106)

Credits-3 **Total Marks = 60**
Time: 6 Hrs. (Two sessions) **45 (EM) + 15 (IA)**

Experiments

Surface Tension

[1] Determine the surface tension of given organic solvents.

[2] Study the effect of soap concentration on the lowering of surface tension of water.

[3] Compare the cleansing powers of two cloth detergents provided to you.

Conductometry

[4] Determine the strength of strong acid by conductometric titration with strong base.

[5] Determine the strength of weak acid by conductometric titration with strong base.

[6] Determine the strength of strong acid and weak acid in a mixture by conductometric titration with strong base.

[7] Study precipitation titration between KCl and $AgNO_3$ conductometrically. Determine the strength of given solution of $AgNO_3$.

[8] Determine solubility and solubility product of sparingly soluble salts like $PbSO_4$, $BaSO_4$.

[9] Determine the relative strength of chloroacetic acid and acetic acid by conductivity measurements.

Potentiometry

[10] Determine the standard electrode potential of Cu and Zn.

[11] Determine the strength of a given solution of ferrous ammonium sulphate by potentiometric titration with $K_2Cr_2O_7$ solution.

[12] Study the precipitation titration between KCl and $AgNO_3$ potentiometrically.

[13] Determine the standard free energy change and equilibrium constant for the reaction

$$Cu + 2Ag^{+} \longrightarrow Cu^{2+} + 2Ag$$

Chemical Kinetics

[14] Study the hydrolysis of methyl acetate in presence of hydrochloric acid.

[15] Study saponification of ethyl acetate by sodium hydroxide solution using same initial concentration of both the reactants.

[16] Study saponification of ethyl acetate by sodium hydroxide solution taking the initial concentration of ester and base to be different.

Adsorption

[17] Verify the Freundlich and Langmuir adsorption isotherms for adsorption of acetic acid/oxalic acid on activated charcoal.

Data Handling

[18] Wherever possible, error analysis in the experimental observations and results should be reported.

Note: Any experiment can be introduced or deleted in the practical class on the basis of availability of instruments/chemicals.

Experiment **Marks: 30**
Lab record & Viva-voce **Marks: 5+10**

Course outcomes:

CO 1 To understand the concept of surface tension and its determination for various organic solvents.

CO 2 To examine surface active agents and their cleansing power.

CO 3 To understand and master the fundamentals of conductometric titrations in aqueous media.

CO 4 To study and conduct experiments related to chemical kinetics for the determination of the order and rate constant of the reaction.

CO 5 To understand and master the fundamentals of potentiometric experiments.

CO 6 To determine extent of adsorption and verify Freundlich and Langmuir adsorption isotherms.

CO 7 To learn data handling and analysis.

CO 8 To develop problem solving ability.

Mapping of Paper No. CHEM 106

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S
CO8	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
2. Findley's Practical Physical Chemistry, B.P. Lavitt, Longman.
3. Practical Physical Chemistry, S.R. Palit and S.K. De, Science.
4. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.

M.Sc. Chemistry Semester I
Organic Chemistry Practical-I (CHEM 107)

Credits-3 **Total Marks = 60**
Time: 6 Hrs. (Two sessions) **45 (EM) + 15 (IA)**

Demonstrations of Laboratory & Purification techniques

Refluxing, Solvent extraction, Purification of solvents and reagents using various techniques like crystallization, distillation, steam distillation, vacuum distillation. Drying and storage of solvents, sublimation etc.

Two-step Preparation of some important organic compounds involving the reactions out of the followings representative reactions)

1. Esterification and saponification
2. Oxidation
3. Reduction or Hydrogenation
4. Partial Reduction
5. Nucleophilic substitution
6. Aromatic electrophilic substitution reaction
7. Condensation reactions
8. Hoffman's Bromamide reaction
9. Heterocyclic synthesis
10. Any other reaction as per requirement

All the students must submit the recrystallised product along with m.p. for all the stages of preparation.

Experiment **Marks: 30**
Lab record & Viva-voce **Marks: 5+10**

Course outcomes:

CO1 To understand the basic laboratory & purification techniques in organic chemistry.

CO2 To know the concept of stepwise synthesis of the organic compounds.

CO3 To explore the practical applicability of different types of organic reactions.

CO4 To perform the experimentation and evaluate the results.

CO5 To develop the ability to compile interpreted information in the form of lab record.

CO6 To face viva-voce after completion of course.

Mapping of Paper No. CHEM-107

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO 1	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 6	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. A Hand book of Organic Analysis-Qualitative and Quantitative by H.T. Clarke, and revised by B.Haynee, Edward Arnold, London 1975.
2. Vogel's Text Book of Practical Organic Chemistry by B.S. Furhen et. al., Longman-Group Ltd.
3. Systematic Qualitative Organic Analysis by H. Middleton, Edward Arnold (Publishers) Limited, London 1959.
4. Elementary Practical Organic Chemistry by Arthur I. Vogel, EX CBS Publishers and Distributors.
5. Experiments in Organic Chemistry by Louis, F.Fieser, D.C. Heath and Company Boston, 1955.

M.Sc. Chemistry Semester II
Inorganic Chemistry-II (CHEM 201)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Electronic Spectra and Magnetic Properties of Transition Metal Complexes-I

Electronic arrangements of microstates, calculation of the number of microstates in various electronic arrangements, spectroscopic term symbols, vector diagrams to indicates coupling of orbital angular momenta in p^2, p^3, d^2 configurations and spin orbit coupling for p^2 arrangement, spectroscopic terms, spectral terms of d^2 to d^8 metal ions, determining the ground state terms-Hund's rules, derivation of the term symbols for a closed subshell.

SECTION – B

Electronic Spectra and Magnetic Properties of Transition Metal Complexes-II

Interpretation of electronic spectra, Orgel diagrams, Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), calculations of Dq, B and β parameters, charge transfer spectra, spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereochemical information, anomalous magnetic moments, magnetic exchange coupling and spin crossover.

Circular Dichroism and Optical Rotatory Dispersion

Polarized light, fundamental symmetry requirements, for optical activity, interaction of polarized light with optically active matter, optical rotation, Cotton effect, configuration of Tris-chelated complexes.

SECTION - C

Metal Δ-Complexes

Metal carbonyls, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding, structure and important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes; tertiary phosphine as ligand.

SECTION - D

Metal Clusters

Higher boranes, carboranes, metalloboranes and metallocarboranes. Metal carbonyl and halide clusters, compounds with metal-metal multiple bonds.

Course outcomes:

CO1 To discuss the various possible arrangements of electrons in terms of term symbols.

CO2 Able to draw the vector diagrams of orbital coupling and spin orbital coupling in p2, p3, d2 configurations.

CO3 To calculate the spectral terms for d2 and d8 metal ions.

CO4 To derive the term symbol for closed subshell.

CO5 To interpret the Orgel diagrams, Tanabe-Sugano diagrams for transition metal complexes (d1-d9 states).

CO6 To apply the spectroscopic methods for assignment of absolute configuration in optically active metal chelates and their stereochemical information.

CO7 To know the concept of Circular Dichroism and Optical Rotatory Dispersion and its application to determine configuration of Tris-chelated complexes.

CO8 To discuss the synthesis, structure characterstic and chemical properties of metal carbonyls, metal nitrosyls.

CO9 To explain the synthesis and structural characterstics and important reactions of dinitrogen and dioxygen complexes.

CO10 To know the various classifications of metal cluster compounds.

CO11 To categories the metal boranes carboranes, metalloboranes and metallocarboranes and their various aspects.

CO12 To discuss the existence, stability and formation of metal-metal multiple bonds.

Mapping of Paper No. CHEM-201

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	M	S	M	S	S	M	S	S	S	M	S
CO2	S	S	S	S	M	M	M	S	S	S	M	S	S	M	S
CO3	S	M	S	M	S	M	S	S	M	S	S	M	S	S	M
CO4	M	S	S	S	S	M	S	S	M	S	S	M	M	S	S
CO5	S	S	M	S	M	M	S	S	S	M	M	S	S	S	M
CO6	M	M	S	M	S	S	M	M	S	S	S	M	S	S	S
CO7	S	S	S	M	S	M	S	S	M	S	S	S	S	M	S
CO8	S	S	S	S	M	M	S	M	M	M	M	S	S	S	M
CO9	M	M	S	M	S	S	M	M	S	S	S	S	M	S	M
CO10	S	M	S	S	S	S	M	S	S	S	M	S	M	M	M
CO11	M	S	S	M	S	M	S	S	S	S	S	S	S	S	S
CO12	S	S	M	S	M	M	S	S	S	M	M	S	S	M	M

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harper & Row.
3. Inorganic Electronic Spectroscopy, A.B.P. Lever, Elsevier.
4. Chemistry of the Elements, N.N. Greenwood and A. Earnshaw, Pergamon.
5. Introduction to Ligand fields; B.N. Figgis, Wiley, New York.
6. Modern Aspects of Inorganic Chemistry; H.J. Emeleus and Sharpe.
7. Introduction to Ligand Field Theory; C.J.Ballahyen, McGraw Hill, New York.
8. Organometallic Chemistry; R.C.Mehrotra and A.Singh, New Age International.
9. Concepts and Models of Inorganic Chemistry; B. Douglas, D.H.McDaniel and J.J. Alexander; John Wiley.
10. The Organometallic Chemistry of the Transition Metals; R.H. Crabtree, John Wiley.

M.Sc. Chemistry Semester II
Physical Chemistry-II (CHEM 202)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION-A

Quantum Mechanics-I

The postulates of quantum mechanics, Linear and Hermitian operators. Commutation of operators and Uncertainty Principle. Eigen functions and Eigen values. Schrödinger equation, free particle, Schrödinger equation for a particle in a box, the degeneracy, particle in a box with a finite barrier, Tunnelling Problem: Tunnelling through a rectangular barrier Schrödinger equation for linear harmonic oscillator and its solution, zero point energy.

SECTION – B

Quantum Mechanics-II

Energy levels and wave-functions of Rigid rotator. Hydrogen atom: Complete solution (separation of variables in spherical polar coordinates and its solution). Radial distributions. Angular momentum and its directional quantization, Angular momentum operators, commutation relations, Ladder operators, shapes of atomic orbitals upto d-level and their discussion.

SECTION – C

Polymers

Basic concepts, Kinetics of Polymerization: Mechanism and Kinetics of chain growth polymerization: free-radical, cationic, anionic and coordination polymerization. Mechanism and Kinetics of step-growth polymerization. Comparison between step-growth and chain polymerization. Molecular mass of polymers: Significance of average molecular mass. Poly-dispersity, Molecular mass distribution curves. Determination of molecular mass by viscosity method. Electrically conducting polymers, Flame retardant polymers, Liquid crystal polymers.

SECTION-D

Nuclear and Radiochemistry

Nuclear stability and binding energy. Mass and binding energy, Nuclear fission and nuclear fusion, fission cross section, chain fission, fission product and fission yield. Interaction of nuclear radiation with matter, Detectors (Proportional, Geiger-Muller and Scintillation counters) and their principles. Units for measuring radiation absorbed, radiation dosimetry.

Radiotracer technique, Activation analysis, isotope dilution technique, Radiochromatography, radiometric titrations, Neutron absorptiometry. Some applications.

Course outcomes:

CO1 To discuss the various postulates of quantum mechanics.

CO2 To learn about operators and their properties.

CO3 To be able to perform operator mathematics including commutation of operators.

CO4 To discuss Heisenberg's Uncertainty Principle.

CO5 To understand and form Schrödinger equation for various systems.

CO6 To be able to setup and solve Schrödinger equation for a particle in a box and for a one-dimensional box with a finite barrier and its application to quantum mechanical tunnelling.

CO7 Able to setup and solve Schrödinger equation for linear harmonic oscillator and its solution.

CO8 To know about angular momentum operators their commutation relations and Ladder operators.

CO9 To explain the shapes of atomic orbitals upto d-level.

CO10 To explain the basic concepts of polymers and polymerization.

CO11 To discuss the Mechanism and Kinetics of chain growth and step growth polymerization.

CO12 To determine the molecular mass by osmometry and viscometry methods.

CO13 To know the basic concept of nuclear and radiochemistry.

CO14 To discuss the structure and functioning of various detectors use in radiochemistry.

CO15 To explain the radiotracer technique, activation analysis and its applications in various aspects.

Mapping of Paper No. CHEM-202

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO11	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO12	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO13	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO14	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO15	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Introduction to Quantum Chemistry, A.K. Chandra, Tata McGraw Hill.
2. Quantum Chemistry, I.M. Levine, Prentice Hall.
3. Essentials of Nuclear Chemistry, 4th Edition (1995), H.J. Arnikar, Wiley Eastern, New Delhi.
4. Nuclear & Radiochemistry, 3rd Edition (1981), G. Fridlander, J.W. Kennedy, E. S. Macias, and J. M. Miller, John Wiley, New York.
5. Introduction to Nuclear Chemistry, B. C. Harvey Prentice-Hall (1969).
6. Polymer Chemistry, Billmayer.
7. Polymer Chemistry, Gowarikar.
8. Principles of Polymerization, Geroge Odian.
9. Quantum Chemistry, B. K. Sen, Kalyani Publishers.
10. Quantum Chemistry, R. Prasad, New Age International.

M.Sc. Chemistry Semester II
Organic Chemistry-II (CHEM 203)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two questions from each of the sections A, B, C & D. The candidates are required to attempt five questions in all, selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Aromatic Electrophilic Substitution

Theoretical treatment of aromatic substitution reactions, structure-reactivity relationship in mono substituted benzene ring, orientation in other ring system, energy profile diagram, Vilsmeir-Haak reaction, Reimer-Tiemann reaction, Bischler-Napieralski reaction, Pechmann reaction, Houben-Hoesch reaction, Fries rearrangement.

Nucleophilic Aromatic Substitution

Mechanism of Nucleophilic substitution in aromatic systems via diazonium ions, by addition-elimination and elimination-addition mechanism (involving arynes); von-Richter rearrangement, Sommelet-Hauser, Stevens and Smiles rearrangements.

General aspects of generation, structure, stability and reactivity of arynes.

SECTION-B

Aliphatic Electrophilic Substitution

Bimolecular mechanisms - S_E2 and S_Ei. The S_E1 mechanism, electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and the solvent polarity on the reactivity.

Neighbouring Group Participation and Carbocation Rearrangements

Anchimeric assistance, neighbouring group participation by non-bonding electrons, sigma and □-bonds, classical and non-classical carbocations. Carbocations rearrangements: migratory aptitudes, Wagner Meerwein rearrangement, pinacol pinacolone rearrangement, Demjanove rearrangement, Tiffeneau-Demjanov ring expansion, aldehyde-ketone rearrangement, dienone-phenol rearrangement and trans-annular rearrangements.

SECTION – C

Free Radicals

General aspects of generation, structure, stability and reactivity of free radicals, types of free radical reactions, halogenation including allylic

halogenation (NBS), auto-oxidation, decomposition of azo compounds and peroxides, coupling of alkynes, homolytic aromatic substitution, Sandmeyer reaction and Hunsdiecker reaction.

Addition to C-C Multiple Bond

General mechanistic considerations, Mechanism of addition of hydrogen halide, H_2O, halogens, HOX and mercuric salt to alkenes and alkynes. Hydroboration, formation of C-C bonds via organoboranes, hydroboration of acetylenes, nucleophilic addition to alkenes.

SECTION-D

Addition to Carbon-Hetero Atoms Multiple Bonds

General mechanistic considerations and reactivity, Hydration and Addition of Alcohols to Aldehydes, Ketones and Acids. Addition -Elimination Reactions of Ketones and Aldehydes, Reactivity of carbonyl compounds towards Addition.

Lithium aluminium hydride reduction- carbonyl compounds, acids, esters, nitriles. Additions of Grignard reagents. Reformatsky reaction, Wittig reaction, Claisen condensation, Dieckman reaction, Aldol condensation, Knoevenagal condensation, Perkin reaction, Cannizzaro reaction, Benzoin condensation, Mannich Reaction, Robinson-Mannich reaction, Ester hydrolysis, aminolysis of esters, amide hydrolysis.

Course outcomes:

CO1 To know the concept of Aromatic Electrophilic Substitution and their applications.

CO2 To understand the mechanisms of Aromatic Nucleophilic Substitution by diazonium salts, arynes.

CO3 To understand the concept of aliphatic electrophilic substitution reaction.

CO4 To know the Bimolecular aliphatic electrophilic substitutions mechanisms - SE2, SE1 and SEi.

CO5 To understand the neighbouring group participation, classical and non-classical carbocation.

CO6 Role of non-bonding electrons, sigma and π-bonds.

CO7 To understand the concept of carbocations rearrangements and migratory aptitudes.

CO8 To describe the generation, structure, stability and reactivity of free radicals.

CO9 To know the mechanisms of addition alkenes and alkynes.

CO10 To study addition to C=O group of aldehydes, ketones and acids.

CO11 To understand and reactivity of carbonyl compounds in various reactions.

CO12 To learn various name reactions related to ketones and aldehydes.

Mapping of Paper No. CHEM- 203

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO3	S	S	M	M	M	S	M	M	S	W	M	S	S	S	S
CO4	S	S	M	M	M	S	M	M	S	W	M	S	S	S	S
CO5	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO6	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO7	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO8	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO9	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO10	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO11	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO12	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Advanced Organic Chemistry Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Plenum.
3. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
4. Structure and Mechanism in Organic Chemistry, C. K. Ingold, Cornell University Press.
5. Organic Chemistry, R. T. Morrison and R. N. Boyd, Prentice-Hall.
6. Modern Organic Reactions, H. O. House, Benjamin.
7. Principles of Organic Synthesis, R. O. C. Norman and J. M. Coxon, Blackie Academic & Professional.
8. Advanced Organic Chemistry and Reaction Mechanisms, Reinhard Bruckner, Academic Press.
9. Organic Chemistry, Jonathan Clayden, Nick Greeves, and Stuart Warren, Oxford University Press.

M.Sc. Chemistry Semester II
Inorganic Chemistry Practical-II (CHEM 204)

Credits-3 **Total Marks = 60**
Time: 6 Hrs. (Two sessions) **45 (EM) + 15 (IA)**

1. Quantitative analysis:

Separation of the metal ions and determination of any one of them using volumetric/gravimetric methods.

Cu-Ni, Cu-Zn, Cu-Al, Ca-Ba, Fe-Mg, Fe-Ni etc.

2. Preparations:

Preparation of the following inorganic compounds and their spectroscopic studies.

I. $Hg[Co(SCN)_4]$
II. $[Cu(NH_3)_4]SO_4.H_2O$
III. Prussian Blue and Turnbull's Blue
IV. $Na[Cr(NH_3)_2(SCN)_4]$
V. $Mn(acac)_3$
VI. $[Ni(NH_3)_6]Cl_2$
VII. $VO(acac)_2$

Experiment **Marks: 30**
Lab record & Viva-voce **Marks: 5+10**

Course outcomes:

CO1 To know the concept of quantitative analysis and its application.

CO2 To separate and quantify the presence of two metal ions in a solution.

CO3 To prepare a sample of various coordination complexes and their spectroscopic study.

CO4 To perform experimentation and evaluate the results.

CO5 To develop the ability to compile interpreted information in the form of lab record.

CO6 To face viva-voce.

Mapping of Paper No. CHEM-204

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	S	M	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S	S	S	S
CO5	S	S	M	M	S	M	S	S	M	S	M	S	S	S	M
CO6	S	S	S	S	M	S	M	S	M	M	S	S	S	M	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. A Text Book of Macro and Semi-micro Quantitative Analysis, A. I. Vogel, Orient Longman.
2. A Vogel's Text Book of Quantitative Inorganic Analysis, J. Bassett, R. C. Denney, G. B. Jaffery and J. Menaham, Longman, London.

M.Sc. Chemistry Semester II
Physical Chemistry Practical-II (CHEM 205)

Credits-3 **Total Marks = 60**
Time: 6 Hrs. (Two sessions) **45 (EM) + 15 (IA)**

Viscosity

[1] Study the variation of viscosity with concentration for a glycerol solution using Ostwald viscometer and thereafter determine the concentration of unknown solution of glycerol.

[2] Determination of molar mass of a polymer.

pH-metry

1. Determine the strength of strong acid by pH-metric titration with strong base.
2. Determine the strength of weak acid by pH-metric titration with strong base.
3. Determine the dissociation constant of acetic acid using pH-meter.

Distribution Law

4. Determine the partition coefficient of iodine for distribution between chloroform and water.
5. Determine distribution coefficient of ammonia between chloroform and water.
6. Determine the formula of the complex formed between copper (II) ion and ammonia using distribution method.

Polarimetry

7. Study the variation of angle of optical rotation with the concentration of any optically active substance (sucrose or glucose) and thereafter determine the unknown concentration of the same substance in given solution.
8. Determine the specific and molecular rotation of sucrose or glucose at a number of concentrations.
9. Study the kinetics of inversion of cane-sugar (sucrose) in presence of an acid.

Refractometry

10. Determine the refractive index of simple organic liquids like methyl acetate, ethyl acetate, methanol, ethanol, n-hexane, chloroform.
11. Determine the refractivity and molar refractivity of some organic liquids like methyl acetate, ethyl acetate, methanol, ethanol, n-hexane, chloroform.
12. Determine the molar refractivities for CH_2, C, H and Cl.
13. Study the variation of refractive index with concentration for KCl solution and thereafter determine the unknown concentration of given KCl solution.

Note: Any experiment can be introduced in the practical class on the basis of availability of instruments/chemicals.

Experiment **Marks: 30**
Lab record & Viva-voce **Marks: 5+10**

Course outcomes:

CO1 To know the concept of viscosity and its determination.

CO2 To determine the viscosity averaged molar mass of a polymer.

CO3 To study the pH metric titration for the determination of normality of acids.

CO4 To determine the partition coefficient of an solute between two immiscible solvents by using distribution law.

CO5 To study the specific and molecular rotation of sucrose or glucose by polarimetry.

CO6 Study the kinetics of inversion of cane-sugar (sucrose) in presence of an acid by polarimetry.

CO7 To determine the refractive index of various organic solvents and its variation with concentration.

CO8 To perform experimentation and evaluate the results.

CO9 To develop the ability to compile interpreted information in the form of lab record.

CO10 To face viva-voce.

Mapping of Paper No. CHEM 205

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	M	S	S	S	S	S	M	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO8	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO9	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO10	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
2. Findley's Practical Physical Chemistry, B.P. Lavitt, Longman.
3. Practical Physical Chemistry, S.R. Palit and S.K. De, Science.
4. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.

M.Sc. Chemistry Semester II
Organic Chemistry Practical-II (CHEM 206)

Credits-3 **Total Marks = 60**
Time: 6 Hrs. (Two sessions) **45 (EM) + 15 (IA)**

Organic Mixture Analysis

Demonstrations of separation of binary mixtures: using H_2O, HCl, NaOH, $NaHCO_3$, Ether or other reagent as may be necessary along with required conditions for their use.

Systematic identification of mixtures of pure organic compounds: separation and identification of simple binary mixtures having acidic, basic and neutral components. Preparation of their derivatives, determination of b.p./m.p. for components and their derivatives.

Any other experiment be added as per requirement

Experiment **Marks: 30**
Lab record & Viva-voce **Marks: 5+10**

Course outcomes

CO1 To introduce and demonstrate the basic principle and techniques of separation of binary organic mixture.

CO2 To analyse qualitatively the presence of extra elements and functional groups in the binary organic mixture along with understanding of chemical reaction involved.

CO3 To make them able to differentiate between aromatic/aliphatic, saturated/unsaturated, hydrocarbon/heterocycles.

CO4 To understand and develop the capabilities of preparing derivatives of different organic compounds bearing various organic functionalities.

CO5 To understand significance of melting point, mixed melting point, boiling point in identification of organic compounds.

CO6 To develop the skill of performing experiments and analysing data to evaluate results.

CO7 To develop the ability to compile interpreted information in the form of lab record.

CO8 To make them mentally and academically sound to face viva-voce.

Mapping of Paper No. CHEM-206

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	M	M	M	W	M	S	S	S	M
CO2	S	S	M	S	M	S	S	M	M	W	M	S	S	S	S
CO3	S	S	M	S	M	S	S	M	S	W	S	S	S	S	S
CO4	S	S	M	S	M	S	S	M	M	W	M	S	S	S	S
CO5	M	M	S	S	W	M	M	M	S	M	S	S	S	S	M
CO6	M	S	S	S	S	S	W	W	S	S	S	S	S	S	S
CO7	M	M	M	M	M	S	W	W	S	S	M	S	S	S	S
CO8	S	S	S	S	M	M	W	S	M	S	S	M	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. "A Handbook of Organic Analysis Qualitative and Quantitative" by H.T. Clarke and revised by B.Maynes, Edward Arnold (Pub.) Ltd. London, 1975).
2. "Systematic Qualitative Organic Analysis" by H.Middleton, Edward Arnold (Publishers) Ltd., London 1959.
3. "A Text Book of Practical Organic Chemistry including Qualitative Organic Analysis" by Arthur I. Vogel, Longmans Green and Co., Ltd., London 1966.
4. "Elementary Practical Organic Chemistry" by Arthur I. Vogel, CBS Publishers & Distributors.
5. "A Guide to spectroscopy in Organic Chemistry' by PAVY.
6. "Organic Spectroscopy', 3rd Ed., by William Kamp. John Wiley & Sons.
7. "Spectroscopic" Methods in Organic Chemistry, D.H. William & Ian Fleming.
8. Vogel's Text Book of Practical Organic Chemistry by B.S. Furners et. al., Longman Group Ltd.

M.Sc. Chemistry Semester III
Inorganic Chemistry General (CHEM-301)

Credits-3 **Total Marks = 60**
Time: 3 Hrs. **45 (EM) + 15 (IA)**

Note: Seven questions will be set; Question 1 will be compulsory covering all the sections. Two questions will be set from each section. The candidates are required to attempt five questions selecting at least one question from each section and compulsory question. All questions carry equal marks.

SECTION A

TRANSPORT AND STORAGE OF DIOXYGEN

Heme proteins and oxygen uptake, structure and function of hemoglobin, myoglobin, hemocyanins and hemerythin, model synthetic complexes of iron and cobalt.

Electron Transfer in Biological Systems

Structure and function of metalloproteins in electron transport processes- cytochromes and iron-sulphur proteins, synthetic models.

SECTION B

Polarography

General principles, diffusion controlled current, Dropping mercury electrode, Ilkovic equation (without proof), Half-wave potentials, over potential, Evaluation of Polarographic waves, Conditions for performing Polarographic determinations and applications of Polarography, theories of hydrogen overvoltage (Tafel's theory, Recombination theory and Volmer, Erdy and Gruss theory / theory of slow discharge of ions).

Vibrational Spectroscopy

Symmetry, shapes and number of IR modes AB_2, AB_3, AB_4, AB_5 and AB_6 (Group theoretical treatment) mode of bonding of ambidentate ligands and diketonato or complexes, application of resonance Raman spectroscopy particularly for the study of active- sites of metalloproteins.

SECTION C

Mossbauer Spectroscopy

Basic principles, spectral parameters and spectrum display. Application of the technique to the studies of (1) bonding and structures of Fe^{2+} and Fe^{3+} compounds including those of intermediate spin, (2) Sn^{2+} and Sn^{4+} compounds – nature of M-L bond, coordination number, structure and (3) detection of oxidation state.

Photoelectron Spectroscopy

Basic principles; photo-electric effect, ionization process, Koopman's theorem. Photoelectron spectra of simple molecules, ESCA, chemical information from ESCA.

Course outcomes:

CO1 To introduce various basic concepts of bioinorganic chemistry to the students.

CO2 To discuss the various dioxygen carriers proteins present in various organisms.

CO3 To explain the electron transfer processes in living organisms with reference to iron sulphur proteins and cytochromes. To know the fundamentals of polarography and its applications.

CO4 To discuss the various theories applicable in polarography.

CO5 To apply the symmetry and group theory in elucidation of structural features with the help of vibrational spectra.

CO6 To study the resonance Raman spectroscopy for the study of active sites of metalloproteins.

CO7 To discuss the basic principles, spectral parameters and display in Mossbauer spectroscopy to explain the oxidation states, coordination number and nature of metal ligand bond.

CO8 To apply the Mossbauer technique for the determination of structure and bonding in iron and tin complexes.

CO9 To know the basic principle of Photoelectron spectroscopy and study of simple molecules.

CO10 To study the chemical information from ESCA.

Mapping of Paper No. CHEM 301

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Principles of Bioinorganic Chemistry: S. J. Lippard and J. M. Berg, University Science Books.
2. The Inorganic Chemistry of Biological Process; M. N. Huges; John Wiley & Sons.
3. Physical methods in Chemistry; R. S. Drago; Saunders, Philadelphia.
4. Fundamentals of Molecular Spectroscopy; C. N. Banwell; McGraw Hill.

M.Sc. Chemistry Semester III
Physical Chemistry General (CHEM-302)

Credits-3 **Total Marks = 60**
Time: 3 Hrs. **45 (EM) + 15 (IA)**

Note: Seven questions will be set; Question 1 will be compulsory covering all the sections. Two questions will be set from each section. The candidates are required to attempt five questions selecting at least one question from each section and compulsory question. All questions carry equal marks.

SECTION – A

Microwave Spectroscopy

Basics of spectroscopy. The rotation of molecules, rotational spectra of rigid diatomic molecules, intensities of rotational spectral lines, isotopic effect, non-rigid rotator, spectra of polyatomic linear molecules and symmetric top molecules.

Infrared Spectroscopy

The vibrating diatomic molecule, force constant, zero point energy, simple harmonic vibrator, anharmonicity, Morse potential, overtones, hot bands, diatomic vibrating rotators, P,Q,R branches, vibration of polyatomic molecules, normal mode of vibrations.

Raman Spectroscopy

Classical and quantum theories, pure rotational Raman spectra of linear molecules, vibrational Raman spectra, mutual exclusion principle, polarization of the light and Raman effect, depolarization of Raman lines.

SECTION – B

Nuclear Magnetic Resonance Spectroscopy

Basic principles of NMR, theory of nuclear magnetic resonance, spin lattice relaxation, spin-spin relaxation, experimental techniques chemical shift, the □-scale of chemical shift, the origin of shielding constant, pattern of coupling, origin of spin-spin coupling, the nuclear overhauser effect.

Nuclear Quadrupole Resonance Spectroscopy

Introduction, energies of quadroupole transitions, effect of magneticfield on the spectra, relationship between electric field gradient and molecular structure, applications, interpretations of structural information from NQR spectra.

Electron Spin Resonance Spectroscopy

Basic principles of ESR, experimental technique, the g-value hyperfine structure, Instrumentation of ESR and its applications to the study of free radicals and fast reactions, spin densities and Mc Connell relationship.

SECTION – C

X-ray Crystallography

Symmetry elements in crystals, stereographic projections, point groups (illustration of R, R-bar, Rm, R/m, (R-bar)m point groups only), miller indices for planes and directions, criteria for determining unit cell of lattice, space lattices, space groups P1, Pbar1, P2, $P2_1$, Pm, Pc, C2, Cm, Cc.

X-ray emission spectra, absorption edges, X-ray filters, Reciprocal lattice concept and its importance, Definition of Reciprocal lattice vector (derivation excluded). Interplanar spacing using reciprocal lattice concept for cubic, tetragonal, orthorhombic and hexagonal crystal systems, Equivalence of Bragg's and Laue condition, Structure factor calculations for primitive, base-centered, body-centered and face centered unit cells. Relation of structure factor to electron density and intensities (derivation excluded), Interpretation of powder photographs for cubic crystals, Data reduction, Phase problem – Patterson method and Heavy-atom method, refinement of structure by successive and difference fourier synthesis. Correctness of a structure (Discrepancy index).

Characteristic difference between X-ray, electron and neutron diffraction techniques.

Course outcomes:

CO1 To know the basic concept of microwave spectroscopy and able to interpret the rotational spectra of rigid diatomic and polyatomic linear molecules and symmetric top molecules.

CO2 To discuss the raman and infrared spectroscopy and its application in physical chemistry.

CO3 To explain the NMR spectroscopy and its significance in chemistry.

CO4 Know about NQR and ESR spectroscopy and their applications in chemistry.

CO5 To identify symmetry elements in crystals and know the classification of crystals under various point groups and space groups.

CO6 To understand the basic concept of reciprocal lattice related to X-ray crystallography and interpretation of powder X-ray diffraction patterns.

CO7 To determine interplanar spacing for different crystal systems and structure factors for different types of lattices.

CO8 To know about phase problem in crystallography and methods for phase determination.

CO9 To know about various crystal structure refinement procedures.

Mapping of Paper No. CHEM 302

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Fundamentals of Molecular Spectroscopy, C.N. Banwell, Tata McGraw Hill.
2. Modern Spectroscopy, J.M. Hollas, John Wiley.
3. Basic Principles of Spectroscopy, R.Chang, McGraw Hill.
4. Introduction to Molecular Spectroscopy, G.M. Barrow, McGraw Hill.
5. Physical Method in Chemistry, R.S. Drago, Saunders College.
6. Elementary Crystallography, L. Azaroff.
7. Structure Determination by X-ray Crystallography, M. Ladd and R. Palmer.
8. X-Ray Structure Determination: A Practical Guide, 2nd Edition by George H. Stout and Lyle H. Jensen.
9. Essentials of Crystallography, McKie & McKie, Blackwell Scientific Publications, 1986.
10. Handbook of X-rays, Emmett and F. Kaelbse, McGraw Hill.

M.Sc. Chemistry Semester III
Organic Chemistry General (CHEM-303)

Credits-3 **Total Marks = 60**
Time: 3 Hrs. **45 (EM) + 15 (IA)**

Note: Seven questions will be set; Question 1 will be compulsory covering all the sections. Two questions will be set from each section. The candidates are required to attempt five questions selecting at least one question from each section and compulsory question. All questions carry equal marks.

SECTION – A

Ultraviolet and Visible Spectroscopy

Introduction and understanding of UV phenomenon, Various electronic transitions (185-800 nm), Beer-Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fieser-Woodward rules for conjugated dienes and carbonyl compounds.

Mass Spectrometry

Introduction, ion production - EI, CI, FD and FAB, Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak, Nitrogen rule, molecular weight determination molecular formula from isotopic ratio data, isotope profile of halogen compounds, fragmentation pattern - simple cleavage, retro-Diels Alder, Hydrogen transfer rearrangement like scrambling, ortho effect, McLafferty rearrangement, fragmentation patterns of hydrocarbons, alcohols, phenols, ethers, aldehydes, ketones, esters, carboxylic acids, amines, nitro, amides, nitriles.

SECTION – B

Nuclear Magnetic Resonance Spectroscopy

General introduction and definition, chemical shift, spin-spin interaction, shielding mechanism, mechanism of measurement, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides & mercapto), complex spin-spin interaction between two, three, four and five nuclei (first order spectra), spin system-Pople notation, virtual coupling. Stereochemistry, concept of topicity, effect of enantiomeric and diastereomeric protons, hindered rotation, Karplus curve - variation of coupling constant with dihedral angle. Fourier transform technique and its advantages. Resonance of other nuclei-F, P.

Tools for simplification of complex NMR spectrum (chemical and instrumental)**:**-Deuteration, changing solvent, trifluoroacetylation, basification

and acidification, lanthanide shift reagents, increased magnetic field strength, double resonance and nuclear overhauser effect (NOE), variable temperature probe. Concept of 2D-NMR spectroscopy.

SECTION – C

Carbon-13 NMR Spectroscopy

General considerations, Comparison of ^{1}H-NMR and ^{13}C-NMR, Proton coupled and proton decoupled ^{13}C-NMR, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants. Nuclear Overhauser effect.

Infrared Spectroscopy

Principle and Theory, Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance. FT-IR.

Composite Problems

Problems involving the application of the above spectroscopic techniques (UV/Visible, IR, NMR and Mass) for structural elucidation of organic molecules.

Course outcomes:

CO1 To know the basic concept of Ultraviolet and Visible Spectroscopy.

CO2 To discuss the Beer-Lambert law, effect of solvent on electronic transitions.

CO3 To apply Fieser-Woodward rules for calculating **λ**max for conjugated dienes and carbonyl compounds.

CO4 To introduce mass spectrometry and difference with spectroscopy.

CO5 To discuss the methods of fragmentation of organic compounds - EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance.

CO6 To apply the concept of mass spectrometry for the determination of structure of organic compounds based on fragmentation.

CO7 To explain the basic concept behind NMR spectroscopy and its application for the structure elucidation.

CO8 To introduce and discuss the chemical shift and coupling constant in relation to stereochemical structure of the organic compound.

CO9 To explain the difference between First order and second order NMR spectra and Tools used for simplification of complex NMR spectrum (instrumental and chemical).

CO10 To know the difference between 1 H-NMR and 13 C-NMR and their applications in structure determination of organic compounds.

CO11 To introduce the concept of 2D-NMR.

CO12 To explain the principle of IR spectroscopy and its application in determining different functional groups present in organic compounds.

CO13 To apply various spectroscopic techniques discussed above for solving/determining the structure of organic compounds (composite problems).

Mapping of Paper No. CHEM-303

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	S	W	M	M	S	S	S	S	S
CO2	S	S	M	S	M	S	S	W	M	W	S	S	S	S	S
CO3	S	S	M	S	M	S	S	W	M	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	M	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S
CO6	S	S	M	S	S	S	S	M	M	S	S	S	S	S	S
CO7	S	S	M	S	S	S	S	M	M	S	S	S	S	S	S
CO8	M	S	M	S	M	S	M	W	M	W	S	S	S	S	M
CO9	M	M	M	S	W	S	S	W	M	W	S	S	S	S	S
CO10	S	S	M	S	S	S	S	M	M	S	S	S	S	S	S
CO11	S	S	S	S	S	S	S	M	M	M	S	S	S	S	S
CO12	S	S	M	S	S	S	S	M	M	S	S	S	S	S	S
CO13	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Introduction to Spectroscopy- A Guide for Students of Organic Chemistry, 2nd Edn. By Donald L. Pavia, Gary M. Lampman and George S. Kriz. Saunders Golden Sunburst Series. Harcourt Brace College Publishers, New York.
2. Spectrometric Identification of Organic Compounds, R. M. Silverstein, G. C. Bassler and T. C. Morrill, John Wiley.

3. Application of Spectroscopy of Organic Compounds, J. R. Dyer, Prentice Hall.
4. Spectroscopic Methods in Organic Chemistry, D. H. Williams and I. Fleming, Tata McGraw-Hill.
5. Spectroscopy of Organic Compounds by P. S. Kalsi, Wiley Estern, New Delhi.
6. Organic Spectroscopy by William Kemp, John Wiley.
7. Organic Mass Spectrometry by K.G. Das & E.P. James, Oxford & IBH Publishing Co.
8. Organic Spectroscopy (Principles & Applications) by Jagmohan.

M.Sc. Chemistry Semester III
Inorganic Chemistry Special-I (CHEM-304)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Reaction Mechanism of Transition Metal Complexes

Energy profile of a reaction, reactivity of metal complexes, kinetic application of valence bond and crystal field theories, kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism, anation reactions, reactions without metal ligand bond cleavage. Substitution reactions in square planar complexes, the Trans effect, mechanism of the substitution reactions.

SECTION – B

Electron Transfer Reactions

Redox reactions, electron transfer reactions, general discussion and kinetic rate laws., mechanism of one electron transfer reactions, outer-sphere type reactions, cross reactions and Marcus-Hush theory, inner sphere type reactions, two electron transfer reactions, metal ion catalysed reactions, mixed valence complexes and their electron transfer.

SECTION – C

Reactions of metal complexes

Reactions of metal complexes having ligands as nitrile, phosphate and azide. Reactivity of coordinated hydrocarbons: a) Nucleophilic addition and substitution b) Rearrangement reactions, Redistribution reactions, Fluxional isomerism of organometallics.

SECTION – D

Inorganic Polymers

Classification, types of inorganic polymerization, comparison with organic polymers, boron-nitrogen polymers, silicones, coordination polymers, phosphorus-nitrogen compounds.

Non-aqueous Solvents

Reaction in non-aqueous media with respect to H_2SO_4, BrF_3, N_2O_4 and phosphoryl chloride; Kinetics and mechanism of coordination reactions in non-aqueous media.

Course outcomes:

CO1 To discuss the Reaction Mechanism of Transition Metal Complexes.

CO2 To know the kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism.

CO3 To describe the Substitution reactions in square planar complexes, with reference to Trans effect and their mechanism.

CO4 To describe electron transfer reactions and mechanism of one electron transfer reactions, outer-sphere type reactions, cross reactions.

CO5 To study the Reactions of metal complexes having ligands as nitrile, phosphate and azide.

CO6 To know the concept of fluxionality and Fluxional isomerism of organometallics.

CO7 To classify inorganic polymers and their comparison with organic polymers.

CO8 To know about boron-nitrogen polymers, silicones, coordination polymers, phosphorus-nitrogen compounds.

CO9 To study the Kinetics and mechanism of coordination reactions in non-aqueous media.

Mapping of Paper No. CHEM 304

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	S	S	S	M	W	M	M	S	S	S	S
CO2	S	S	S	S	S	S	S	S	W	M	M	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	M	M	S	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S	S	S	M	S	M
CO6	S	S	M	M	M	S	S	M	M	M	S	S	M	S	S
CO7	S	S	S	M	S	M	M	S	M	M	S	S	S	M	S
CO8	S	S	S	W	W	S	M	S	M	S	M	S	S	S	S
CO9	S	S	S	W	M	M	S	M	S	W	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Mechanism of Inorganic Reactions; F.Basolo and R.G. Pearson, John Wiley and Sons, New York.

2. Inorganic Reaction Mechanism; M.L. Tobe; Nelson, Wlaton and Thames.

3. Inorganic Chemistry; K.F. Purcell, J.C. Kotz; Holt-Sanders International Editions; Philadelphia.
4. The Chemistry of Molten Salts; H. Bloom Benjamin, New York.
5. Principles and Application of Organotransition Metal Chemistry, J.P. Collman, L.S. Hegsdus, J.R. Norton and R.G. Finke, University Science Books.
6. The Organometallic Chemistry of the Transition Metals; R.H. Crabtree, John Wiley.
7. Organometallic Chemistry, R.C. Mehrotra and A. Singh, New Age International.
8. Coordination Chemistry; Banerjea; Tata McGraw Hill.
9. Inorganic Chemistry, A Modern Introduction; T. Moeller; John Wiley and Sons.
10. Concepts and Models of Inorganic Chemistry; B. Douglas, D.H. McDaniel and J.J. Alexander; John Wiley and Sons Inc.

M.Sc. Chemistry Semester III
Inorganic Chemistry Special-II (CHEM-305)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Alkyls and Aryls of Transition Metals

Types, routes of synthesis, stability and decomposition pathways, organocopper in organic synthesis.

Fluxional Organometallic compounds

Fluxionality and dynamic equilibria in compound such as η^2-olefin, η^3-allyl and dienyl complexes, Carbonyl scrambling.

SECTION – B

Compounds of Transition Metal-Carbon Multiple Bonds

Alkylidenes, alkylidynes, low valent carbenes and carbynes- synthesis, nature of bond, structural characteristics, nucleophilic and electrophilic reactions on the ligands, role in organic synthesis.

Transition Metal Compounds with Bonds to Hydrogen

SECTION – C

Transition Metal □-Complexes

Transition metal □-complexes with unsaturated organic molecules, alkenes, alkynes, allyl, diene, dienyl, arene and trienyl complexes, preparations, properties, nature of bonding and structural features. Important reactions relating to nucleophilic and electrophilic attack on ligands and to organic synthesis.

SECTION – D

Homogeneous Catalysis

Stoichiometric reactions for catalysis, homogeneous catalytic hydrogenation, Zeigler-Natta polymerization of olefins, catalytic reactions involving carbon monoxide such as hydrocarbonylation of olefins (oxo reaction), oxopalladation reactions, activation of C-H bond.

Course outcomes:

CO1 To explain the use of organocopper compounds in organic synthesis.

CO2 To know the concept of Fluxionality and its dynamic equilibria in compounds such as η^2-olefin, η^3-allyl and dienyl complexes.

CO3 To discuss the structural characteristics, nucleophilic and electrophilic reactions of transition metal – carbon multiple bonds.

CO4 To know the classification of transition metal pi complexes, their synthesis, structural characterstics and their important reactions.

CO5 To learn about various types of homogenous catalysis reactions and their utility in organic synthesis.

Mapping of Paper No. CHEM 305

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Mechanism of Inorganic Reactions; F.Basolo and R.G. Pearson, John Wiley and Sons, New York.
2. Inorganic Chemistry; K.F. Purcell, J.C. Kotz; Holt-Sanders International Editions; Philadelphia. .
3. Principles and Application of Organotransition Metal Chemistry, J.P. Collman, L.S. Hegsdus, J.R. Norton and R.G. Finke, University Science Books.
4. The Organometallic Chemistry of the Transition Metals; R.H. Crabtree, John Wiley.
5. Organometallic Chemistry, R.C. Mehrotra and A. Singh, New Age International.
6. Coordination Chemistry; Banerjea; Tata McGraw Hill.
7. Concepts and Models of Inorganic Chemistry; B. Douglas, D.H. McDaniel and J.J. Alexander; John Wiley and Sons Inc.

Or

M.Sc. Chemistry Semester III
Physical Chemistry Special-I (CHEM-304)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION - A

Quantum Mechanics-I

Problem of two electrons, exchange interactions. Approximate methods: First order time-independent perturbation theory for non-degenerate states. Variation theorem and variational methods. Ground and excited state of helium atom. Coupling of angular momentum for many electron system, spin-orbit coupling, Molecular Term symbols. Born-Oppenheimer approximation, the hydrogen molecule ion, the hydrogen molecule, their symmetric and antisymmetric solution (without actual evaluation of various integrals). Self-consistent field method.

SECTION - B

Quantum Mechanics-II

Valence bond and MO (LCAO) treatment of hydrogen molecule. Comparison of the MO and VB treatments and their equivalence limit. Configuration Interaction. Extension of MO theory to other systems- Homonuclear and heteronuclear diatomics, simple polyatomic molecules.

The pi-electron approximation, Huckel theory of conjugated systems. Applications to ethylene, butadiene, cyclobutadiene and cyclopropenyl molecules. Calculation of properties- Delocalization energy, electron density, bond order. Ab initio and Semi-empirical Methods for Closed Shell Systems.

SECTION-C

Quantum Photochemistry

Types of Photophysical Pathways, Radiative and Non-Radiative transitions, Einstein Treatment of Absorption and Emission Phenomena, Probability of Induced Emission and Its Application to Lasers, Time-dependent Schrödinger equation, Time-dependent perturbation theory for photochemical systems, Transition moment integral, Theoretical Absorption Intensity, Oscillator Strength, Rules governing the transition between two energy states.

SECTION-D

Micelles

Surface active agents, classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration (CMC), factors affecting

the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization-phase separation and mass action models, solubilization, emulsions, micro emulsion.

General Properties of Liquids

Liquids as dense gases, liquids as disordered solids, some thermodynamics relations, internal pressure and its significance in liquids, equation of state, critical constants, Different types of intermolecular forces in liquids.

Course outcomes:

CO1 To explain time-independent perturbation theory and variational methods.

CO2 To describe Born-Oppenheimer approximation.

CO3 To obtain symmetric and antisymmetric solution of hydrogen molecule and its ion.

CO4 To compare MO and VB treatment of hydrogen molecule.

CO5 To explain Self Consistent Field method.

CO6 To discuss Hückel theory of conjugated systems and apply it to various organic molecules.

CO7 To describe Ab initio and Semiempirical methods for closed shell systems.

CO8 To discuss photophysical pathways, radiative and non-radiative transitions and Einstein's treatment of absorption and emission phenomena.

CO9 To understand the probability of induced emission and its application to lasers.

CO10 To know about Time-dependent Schrödinger equation.

CO11 To describe time-dependent perturbation theory applicable to photochemical systems.

CO12 To know about theoretical absorption intensity and oscillator strength.

CO13 To explain rules governing the transition between two energy states.

CO14 To express the knowledge about various terms associated with micelles.

CO15 To explain the thermodynamics of micellization.

CO16 To discuss various terms about general properties of liquids.

CO17 To describe different types of intermolecular forces in liquids.

Mapping of Paper No. CHEM-304

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO11	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO12	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO13	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO14	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO15	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO16	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO17	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Theoretical Chemistry, S. Glasstone, Affiliated East-West Press.
2. Quantum Mechanics, H.L. Strauss, Prentice Hall.
3. Quantum Chemistry, B.K. Sen, Kalyani Publishers
4. Quantum Chemistry, R.K. Prasad, New Age International.
5. A Textbook of Physical Chemistry, Vol. 4, K.L. Kapoor, MacMillan India Ltd.
6. Introduction to Quantum Chemistry, C. R. Gatz, Charles E. Merrill Pub. Co.
7. Molecular Quantum Mechanics, P.W. Atkins and R.S. Friedman, 3rd Edition (1997), Oxford University Press, New York.
8. Quantum Chemistry, H. Eyring, J. Walter and G.E. Kimball (1944) John Wiley, New York.
9. Quantum Chemistry, I.N. Levine, 5th edition (2000), Pearson Educ., Inc., New Delhi.

10. Fundamentals of Photochemistry, K.K. Rohtagi-Mukherjee, 3rd Edition, New Age.
11. Micelles, Theoretical and Applied Aspects, Y. Moroi, Plenum Press.
12. Significance of liquid structures, H. Eyring.

M.Sc. Chemistry Semester III
Physical Chemistry Special-II (CHEM-305)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Statistical Mechanics

Ensemble averaging, postulates of ensemble averaging. Micro canonical, canonical and grand canonical ensembles, corresponding distribution laws (using Lagrange's method of undetermind multipliers). Maxwell- Boltzmann statistics, Boltzmann distribution, derivation of the Boltzmann distribution expression, determination of the Boltzmann constant, Maxwell distribution law of velocities from Boltzmann distribution expression.

SECTION – B

Quantum Statistics

The Bose-Einstein statistics, statistics of a photon gas, the Fermi-Dirac statistics, Fermi-Dirac systems, extreme gas degeneration, slight gas degeneration, electron gas in metals, thermionic emission and comparison of two statistics, non degenerate and degenerate systems.

SECTION – C

Statistical Thermodynamics – I

Partition function and thermodynamic properties, partition function and factorization of partition function, translational partition function, translational thermodynamic function, atoms and monoatomic molecules, Sackur-Tetrode equation, diatomic molecules, separation of internal partition function. Rotational and vibrational energies, entropy due to internal degrees of freedom. Rotational partition function, rotational partition function for polyatomic molecules, vibrational partition function.

SECTION-D

Statistical Thermodynamics – II

Determination and calculation of thermodynamic properties i.e. internal energy, entropy, Helmholtz and Gibbs free energy, ortho and para hydrogen states, free energy functions. Partition function and equilibrium constant, effect of nuclear spin, isomolecular reaction, isotopic exchange reactions. Einstein theory and Debye theory of heat capacities of monatomic solids.

Non-equilibrium Thermodynamics

Meaning and scope of irreversible thermodynamics. Thermodynamic criteria for non-equilibrium states, Phenomenological laws-liner laws, Gibb's equation, Onsager's reciprocal relation, Entropy production-specific laws of entropy production, Non-equilibrium stationary states, Prigogine's principle of entropy production, Coupled phenomena. Some important applications.

Course outcomes:

CO1 To describe types of ensembles.

CO2 To be able to discuss corresponding distribution laws.

CO3 To explain Maxwell-Boltzmann statistics.

CO4 To discuss Maxwell distribution law of velocities.

CO5 To describe Bose-Einstein and Fermi-Dirac statistics and their comparison.

CO6 To explain extreme and slight gas degeneration.

CO7 To know about partition function and its factorization.

CO8 To discuss translational thermodynamic function.

CO9 To describe separation of internal partition function.

CO10 To explain rotational and vibrational partition functions.

CO11 To be able to evaluate thermodynamics properties.

CO12 To describe free energy functions.

CO13 To discuss isotopic exchange reactions.

CO14 To know about Einstein theory and Debye theory of heat capacities of monoatomic solids.

CO15 To discuss scope of irreversible thermodynamics.

CO16 To explain phenomenological laws.

CO17 To describe specific laws of entropy production.

CO18 To discuss coupled phenomenon.

Mapping of Paper No. CHEM-305

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO11	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO12	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO13	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO14	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO15	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO16	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO17	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO18	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Introduction to Statistical Thermodynamics, H. Dole.
2. Theoretical Chemistry, S.Glasstone, Affiliated East-West Press.
3. Thermodynamics, Lewis and Randall.
4. Chemical Physics, J.C. Slater.
5. Non-equilibrium Thermodynamics, C. Kalidas.

Or

M.Sc. Chemistry Semester III
Organic Chemistry Special-I (CHEM-304)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Organometallic Reagents I

Principle, preparations, properties and applications of the reagents of the following metals/non-metals in organic synthesis with mechanistic details:

Li, Mg, Cd, Zn, Cu, S, Si, B and I.

SECTION - B

Organometallic Reagents II

Principle, preparations, properties and applications of the reagents of the following metals in organic synthesis with mechanistic details Pd, Ni, Fe, Co, Rh, Cr and Ti compounds.

SECTION –C

Oxidation

Introduction, Different oxidative processes, Hydrocarbons- alkenes, aromatic rings, saturated C-H groups (activated and unactivated). Alcohols, diols, aldehydes, ketones, ketals and carboxylic acids. Amines, hydrazines, and sulphides. Oxidations with ruthenium tetraoxide, and thallium (III) nitrate.

SECTION –D

Reduction

Introduction. Different reductive processes. Hydrocarbons– alkanes, alkenes, alkynes and aromatic rings. Carbonyl compounds-aldehydes, ketones, acids and their derivatives. Epoxides.Nitro, nitroso, azo and oxime groups. Hydrogenolysis.

Course outcomes:

CO1 To understand the principle of Organometallic Reagents and their applications in organic synthesis.

CO2 To know about the role of various Organometallic Reagents of Li, Mg, Cd, Zn,Cu, S, Si, B, I, Pd, Ni, Fe, Co, Rh, Cr and Ti compounds in organic synthesis along with their preparations, properties and applications of these reagents with mechanistic details.

CO3 To understand the principle of oxidation, oxidative processes related to Hydrocarbons- alkenes,aromatic rings, activated and unactivated saturated C-H groups, alcohols, diols, aldehydes, ketones, ketals and carboxylic acids. Amines, hydrazines, and sulphides

CO4 To learn about applications of ruthenium tetraoxide and thallium (III) nitrate in oxidation of various types of compounds.

CO5 To understand the general pathways of reduction reactions. Reduction of Hydrocarbons – alkanes, alkenes, alkynes, substituted and unsubstituted aromatic rings.

CO6 To be able to understand the reduction of carbonyl compounds – aldehydes, ketones, acids and their derivatives, Epoxides. reduction of compounds containing nitro, nitroso, azo and oxime groups.

Mapping of Paper No. CHEM-304

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO 1	S	S	S	S	S	M	M	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 6	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Modern Synthetic Reactions, H.O. House, W.A. Benzamin.
2. Some Modern Method of Organic Synthesis, W. Carruther, Cambridge Univ. Press.
3. Advanced Organic Chemistry, Reactions Mechanism and Structure, J. March, John Wiley.
4. Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic & Professional.
5. Structure and Mechanism in Organic Chemistry, C. K. Ingold, Cornell University Press.
6. Advanced Organic Chemistry and Reaction Mechanisms, Reinhard Bruckner, Academic Press.
7. Organic Chemistry, Jonathan Clayden, Nick Greeves, and Stuart Warren, Oxford University Press.

M.Sc. Chemistry Semester III
Organic Chemistry Special-II (CHEM-305)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all, selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Pericyclic Reactions

Molecular orbital symmetry, frontier orbital of ethylene, 1,3-butadiene, 1,3,5 hexatriene and allyl system classification of pericyclic reactions, Woodward - Hoffmann correlation diagram. FMO & PMO approach, Electrocyclic reaction - conrotatory and disrotatory motions. 4n, 4n+2, allyl systems, Ring opening of cyclopropyl halides and tosylates, cycloadditions-antarafacial and suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes, 1,3-dipolar cycloadditions and cheleotropic Reactions.

SECTION – B

Pericyclic Reactions

Sigmatropic Rearrangements-suprafacial and antarafacial shifts of H, sigmatropic shifts involving carbon moieties, retention and inversion of configuration, [3,3] and [5,5] sigmatropic rearrangements, detailed treatment of Sommelet-Hauser, Claisen and Cope rearrangements introduction to ene reactions. Simple problems on Pericyclic reactions, Group transfers and eliminations.

SECTION – C

Photochemistry

Excitation and excited states, Franck-Condon Principle, Jablonski diagram, energy transfer photosensitization, quenching, quantum efficiency and quantum yield.

Photochemistry of carbonyl compounds (Norrish type I and type II changes, photoreaction of cyclic ketones, Paterno-Buchi reaction and Photoreducation. Photochemistry of olefins and 1, 3-Butadiene (cis-trans isomerisation, dimerisation and cycloadditions).

SECTION – D

Photochemistry

Di-π-methane rearrangement, enone and dienone rearrangements, photochemistry of aromatic compounds (substitution, isomerization, cyclization and cycloaddition reactions), Photo-Fries rearrangement, photolysis of nitrile

esters and Barton reaction, Hoffman-Loefller-Freytag reaction, synthesis of vitamin-D.

Course outcomes:

At the end of the course, the students would be able to:

CO1 Appreciate the role of Molecular Orbitals in analysing Pericyclic Reactions.

CO2 Interpret the stereochemical course of a Pericyclic Reaction and identify the product.

CO3 Predict the course of an organic photochemical reaction and identify the product with the type of functional group present on the molecule.

Mapping of Paper No. CHEM-305

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	M	M	S	W	S	S	S	S	S
CO2	S	S	S	S	S	S	M	M	S	W	S	S	S	S	S
CO3	S	S	S	S	S	S	M	M	S	W	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Pericyclic Reactions, S.M. Mukherji Macmilan India.
2. Organic Photochemistry, J Coxan & B. Halton, Cambridge University Press.
3. Introductory Photochemistry, A. Cox and T. Camp McGraw Hill.
4. The Conservation of Orbital Symmetry, R.B. Woodward and R. Hoffmann" Verlag Chemie Academic Press.
5. Problem Solving approach to Orbital Symmetry, R.E. Lehr and A.P. Merchand.
6. Organic Reactions and Orbital Symmetry, T.L. Gilchrist and R.C. Storr, Cambridge University Press, Cambridge, 2nd Edn. 1979.

Or

M.Sc. Chemistry Semester III
Pharmaceutical Chemistry Special-I (CHEM-304)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Synthon approach-I

Definition of terms- Disconnection, synthons, functional group interconversions (FGI), synthetic equivalents. General principles of the disconnection approach, the importance of order of events in organic synthesis, one group C-X and two group C-X, One group C-C disconnections-alcohols and carbonyl compounds, chemoselectivity, reversal of polarity, amine synthesis.

SECTION – B

Synthon approach-II

Two group C-C disconnections-1, 3 & 1,5-difunctionalized compounds, Stereochemistry in organic synthesis-stereoselectivity, stereospecificity, regioselectivity and regiospecificity.

Synthon approach in the synthesis of the following drugs: Salbutamol, Propanolol, moxnidazole, nafimidone, drildone, belfosih. Ocfentanil, afornine Principle of protection of alcoholic, amino, carbonyl and carboxylic groups.

SECTION – C

Heterocyclic Compounds - I

Systematic (Hantzsch-Widman) nomenclature for monocylic and fused ring systems.

Methods of synthesis and Reactions including mechanism of the following five-membered 1,2- and 1,3-heterocycles: pyrazole, imidazole, oxazole, isooxazole, thiazole, isothiazole; their basic character.

SECTION – D

Heterocyclic Compounds - II

Methods of synthesis and Reactions including mechanism of the following six-membered heterocycles: purines and pyrimidines. Caffeine, xanthine, theobromine, theophylline.

Methods of synthesis and Reactions including mechanism of-Indoles, quinolines and isoquinolines.

Flavanoids: Occurrence, nomenclature and general methods of structure determination, isolation, importance and synthesis of Cyanin, Quercetin, Diadzein and Chrysin.

Course outcomes:

The purpose of the paper is to make students able to know the concepts of synthetic chemistry like synthon approach, protection, heterocyclic chemistry and their application in drugs.

CO1 To be familiar with basic concepts of synthon approach explaining one- & two-group C-X and C-C disconnections, chemoselectivity, reversal of polarity, amine synthesis, stereoselectivity, stereospecificity, regioselectivity and regiospecificity.

CO2 To apply the concept of disconnection approach for the synthesis of drug molecules.

CO3 To apprise of protection of important functional groups namely alcoholic, amino, carbonyl and carboxylic groups.

CO4 To be acquainted with mechanistic details of the methods of preparation and reactions of five-membered diheteroatomic molecules, 1,2- and 1,3-azoles.

CO5 To make to know about the synthesis and reaction of purines and pyrimidines and the mechanistic pathways.

CO6 To inform about xanthines, indole, quinoline, isoquinoline

CO7 To offer details of flavonoids including Cyanin, Quercetin, Daidzein and Chrysin.

Mapping of Paper No. CHEM 304

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Designing Organic Synthesis, S.Warren, Wiley.
2. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge Univ. Press.
3. Modern Synthetic Reactions, H. O. House, W.A. Benzamin.
4. Advanced Organic Chemistry Reactions, Mechanisms a Structures, J. March, Wiley.
5. Advanced Organic Chemistry Part B. F.A. Carey and R.J. Sundberg, Plenum Press.
6. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.

M.Sc. Chemistry Semester III
Pharmaceutical Chemistry Special-II (CHEM-305)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

General mode of action, Medicinal Uses and Synthesis of Important Drugs in the Following Categories.

Antineoplastic Agents: Metastasis, classification, mode of action of alkylating agents (synthesis of mephalan, thiotepa, busulfan, lomustine) and antimetabolites (synthesis of methotrexate, 5-fluorouracil, 6-mercaptopurine), hormone based therapies, plant products, radiotherapeutic agents. Taxol realated compounds.

Antiviral agents: RNA and DNA viruses, An introduction to AIDS, how HIV infects the system, mode of action of nucleoside reverse transcriptase inhibitors- AZT, ddI, ddC, d4T & 3TC and HIV-protease inhibitors-Ritonavir. Synthesis of AZT.

An overview of HIV entry inhibitors, Integrase inhibitors, Chemokine receptor binders, Inhibitors of gp41 fusion activity.

Antimalarials: Cinchona alkaloids, 4-aminoquinolines, 8-aminoquinolines, Mefloquine, 9-aminoacridines. Synthesis of Mefloquine, chloroquine, primaquine.

SECTION – B

Antibiotics

Penicillins: Discovery, mode of action, SAR, Penicillins and semi-synthetic penicillins, problems of sensitivity to acids, β-lactamases and narrow spectrum of activity; solving these problems leading to the development of penicillin V, oxacillin, cloxacillin, ampicillin, amoxycillin, carbenicillin and carfecillin; β-lactamase inhibitors-Clavulanic acid, Olivanic acids.

Cephalosporins: Classification, SAR, synthesis of cephalosporin-C, recent advances of fourth generation cephalosporins

Sulfonamides-SAR, mode of action. Sulfanilamide analogs- synthesis of Sulfathiazole, sulfadiazine, sulfacetamide.

Tetracyclins and aminoglycosides: Structure, mode of action, SAR, streptomycin, neomycin, gentamycin; Macrolides- mode of action, erythromycin, azithromycin; Synthesis of chloramphenicol.

Quinolones, fluoroquinolones: Structure, mode of action, synthesis of nalidixic acid and ciprofloxacin Lincomycins.

SECTION – C

Prostaglandins: General Introduction, nomenclature of prostaglandins and eicosanoid biosynthesis.

Non-Steroidal anti-inflammatory agents: Classification, mode of action, COX-2 inhibitors, salol principle.

Synthesis of celecoxib, valdecoxib, aspirin, phenbutazone, mefanamic acid, indomethacin, piroxicam, diclofenac, Naproxen.

Antipyretic-Analgesics: opoid antagonists and agonists-codeine and heroin), synthesis of meperidine, methadone, dextropropoxyphen.

SECTION – D

Antifertility agents: Ovulation inhibitors and related hormonal contraceptives- norethindrone, norethynodrel, estradiol and mestranol. Recent Advances.

Antihypertensive agents: Classification, Hypertension, Renin-Angiotensin system, mode of action, Calcium channel blockers, ACE inhibitors and α-blockers, β-blockers, centrally acting adrenergic drugs, Synthesis of atenolol, clonidine, methyldopa, guanabenz, diltiazem, captopril, enalapril.

Course outcome: The purpose of the paper to put forward the description of major classes of pharmaceutical agents especially the mode of action and synthesis.

CO1 To discuss antineoplastic agents including alkylating agents, antimetabolites, radiotherapeutic agents, hormone based therapies, plant products.

CO2 To explore antiviral agents like reverse transcriptase inhibitors, protease inhibitors, integrase inhibitors, chemokine receptor binders, Inhibitors of gp41 fusion activity, HIV entry inhibitors.

CO3 To enrich the knowledge about antimalarials (cinchona alkaloids, aminoquinolines, 9-aminoacridines.

CO4 To understand penicillins in detail, lactamase inhibitors, cephalosporins, sulfonamides, tetracyclins, aminoglycosides, macrolides, quinolones, lincomycins.

CO5 To inform about prostaglandins, NSAIDS, antipyretic-analgesics.

CO6 To know about the antifertility agents, ovulation inhibitors and related hormonal contraceptives.

CO7 To aware about antihypertensive agents, calcium channel blockers, ACE inhibitors and alpha-blockers, beta-blockers, centrally acting adrenergic drugs.

Mapping of Paper No. CHEM 305

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Ed. Robert F. Dorge.
2. Burger's Medicinal Chemistry and Drug Discovery Vol-I Ed. M.E. Wolf, John Wiley.
3. Goodman and Gilman's Pharmacological Basis of Therapeutics, McGraw-Hill.
4. Organic Chemistry Vol.-2 I.L. Finar, ELBS.

M.Sc. Chemistry Semester III
Inorganic Chemistry Special Practical I & II
(CHEM 306 & CHEM 307)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Inorganic Chemistry Special Practical I (CHEM-306)

Preparations:

Preparation of selected Inorganic Compounds and their Characterization by elemental analysis and spectroscopic methods (IR, NMR, EPR, Magnetic moment etc.).

I Choloropentaamminecobalt (III) Chloride.

II Nitro/Nitritopentaamminecobalt (III) Chloride (Distinction between nitro and nitrito by IR).

III Potassium trioxalatoferrate (III).

IV Chromous acetate.

V Cis and trans $[Co(en)_2Cl_2]$.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To demonstrate the synthesis of selected inorganic compounds.

CO2 Able to interpret the structure of synthesized inorganic complexes by various spectroscopic techniques.

CO3 To perform experimentation and evaluate the results.

CO4 To develop the ability to compile interpreted information in the form of lab record.

CO5 To face viva-voce.

Mapping of Paper No. CHEM-306

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	S	S	M	S	S	M	S	S	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S	M	S	S	M	M
CO3	S	S	S	M	S	M	S	S	S	S	S	S	M	S	S
CO4	M	S	S	S	S	M	S	S	M	S	S	S	S	S	M
CO5	S	S	M	S	M	M	S	S	S	M	M	S	S	M	M

S = Strong, M = Medium, W = Weak

Inorganic Chemistry Special Practicals II (CHEM-307)

Instrumentation:

I Spectrophotometric Determinations.

II Conductometric Titrations.

III Flame Photometry.

IV Potentiometric/pH-analysis.

V Electrogravimetric analysis.

VI Polarographic analysis.

VII Any other techniques introduced.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To introduce various instrumental techniques present in inorganic laboratories.

CO2 Develop the ability to demonstrate the qualitative and quantitative application of spectrophotometric technique.

CO3 Develop the ability to learn potentiometric, polarographic and conductometric titrations.

CO4 Learn to perform experimentation and evaluation of the results.

CO5 Develop the ability to compile interpreted information in the form of lab record.

CO6 Develop the ability to express during Viva -Voce.

Mapping of Paper No. CHEM-307

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Synthesis and Characterization of Inorganic compounds. W. L. Jolly, Prentice Hall, Englowood.
2. A Text Book of Quantitative Analysis: A. I. Vogel, ELBS, London.
3. Inorganic Preparations: W. G. Palmer.

Or

M.Sc. Chemistry Semester III
Physical Chemistry Special Practical I & II
(CHEM 306 & CHEM 307)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Physical Chemistry Special Practical I (CHEM-306)

Potentiometry

1. Determination of activity coefficient of Ag^+ in a solution of silver nitrate and to study the effect of potassium nitrate on the activity coefficient of silver nitrate.
2. Determination of the cell Pt, $H_2|HCl\ AgCl|Ag$ with various concentrations of HCl and to obtain the activity coefficient of HCl.
3. Determination of solubility of silver halides in water.
4. Determination of first and second ionization constant of phosphoric acid.
5. Study of silver-ammonia complex and determination of the stability constant.
6. Determination of strength of ferrous ammonium sulphate using potassium dichromate or ceric sulphate and determination of redox potential.
7. Determination of strength of HCl and CH_3COOH in a mixture using NaOH.
8. Titration of weak/strong acid with strong base using quinhydrone and determination of dissociation constant of the acid.
9. Study of equilibrium constant of the reaction $Fe^{+++} + Ag \rightarrow Fe^{++} + Ag^+$.
10. To determine the degree of hydrolysis of aniline hydrochloride.
11. Titration of halides with $AgNO_3$ individually and in the mixture of two halides.

Polarimetry

1. Determine the percentage of two optically active substances in a mixture polarimetrically.
2. Determination of relative strength of acids by the study of inversion of sucrose.
3. Investigate the effect of substitution of chloride ions on rate constant of inversion of cane sugar by using mono-, di- and tri-chloroacetic acids as catalysts.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To apply the technique of potentiometry for :

- ❖ determining activity coefficients of different electrolytes.
- ❖ determining stability constants of the complexes.
- ❖ finding solubility of sparingly soluble salts.
- ❖ performing acid-base titrations.
- ❖ studying the equilibrium constant for redox reactions.
- ❖ determining liquid junction potential.

CO2 To apply the technique of polarimetry for:

- ❖ Determining the percentage of optically active substance in a mixture.
- ❖ Finding out the relative strength of acids.
- ❖ Studying the effect of substituents on rate constant of inversion kinetics.

CO3 To develop the ability to compile interpreted information in the form of lab record.

CO4 To face viva-voce.

Mapping of Paper No. CHEM-306

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Physical Chemistry Special Practical II (CHEM-307)

Conductometry

1. Determination of the equivalent conductance of weak acid (benzoic and acetic acid) at several concentrations and the dissociation constant of the acid.
2. Determination of the equivalent conductance of strong electrolytes such as HCl, KCl, KNO_3 and NaCl and the validity of Onsagar equation.
3. Determination of solubility of silver halides.
4. Study of degree of hydrolysis of aniline hydrochloride.
5. Conductometric titration of: (i) Strong acid vs. strong base, (ii) Strong acid vs. weak base, (iii) Weak acid vs. strong base, (iv) Weak acid vs. weak base, (v) CH_3COOH + HCl vs. NaOH, (vi) $CuSO_4$ vs. NaOH.

6. Determine the critical micelle concentration (CMC) of a surfactant (sodium lauryl sulphate) by conductivity method.

Colorimetry/Spectrophotometry

7. Verification of the Lambert-Beer's law using solutions such as $K_2Cr_2O_7$, $CuSO_4$, $KMnO_4$ in water and I_2 in CCl_4.
8. Study of iron-tiron and iron-salicylic acid complexes.
9. Determination of the composition of various mixtures spectrophotometrically:
   (i) Potassium dichromate and potassium permanganate.
   (ii) Crystal violet and aurine.
10. Determine the dissociation constant of an indicator spectrophotometrically.

Note: Any experiment may be introduced/deleted in the practical class based on the availability/non-availability of the instruments/chemicals.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To apply the conductometry method for :

- Determining equivalent conductance of weak and strong electrolytes.
- Determining solubility of sparingly soluble silver salts.
- Performing conductometric acid base titrations.
- Determining CMC of surfactants.

CO2 To apply the technique of spectrophotometry for :

- Verifying Lambert-Beer's law.
- Determining composition of various mixtures.

CO3 To develop the ability to compile interpreted information in the form of lab record.

CO4 To face viva-voce.

Mapping of Paper No. CHEM-307

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Practical Physical Chemistry, S.R. Palit and S.K. De, Science.
2. Experimental Physical Chemistry, R.C. Das and B. Behera,McGraw Hill.
3. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
4. Findley's Practical Physical Chemistry, B.P. Lavitt, Longman.

Or

M.Sc. Chemistry Semester III
Organic Chemistry Special Practical I & II
(CHEM 306 & CHEM 307)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Organic Chemistry Special Practical I (CHEM-306)

1. **Preparations of Organic compounds involving two and three stages**: Typical preparations from which the two and three stage preparations can be chosen are:
   1. Toluene — p-nitrotoluene — p-nitrobenzoic acid — p-amino benzoic acid
   2. Hydroquinone — Benzoquinone — 5- Hydroxy benzoxathiole-2-one —5-Acetoxy benzoxathiol-2-one
   3. Benzene — Acetopheneone — Acetophenone oxime — Acetanilide
   4. Benzaldehyde — Benzoin — Benzil — Benzillic acid
   5. Acetylacetone — 4,6-dimethylpyridine-2-mercaptopyrimidine — 4,6-dimethyl-2- hydrazinpyrimidine — 1-(4'-6'-dimethylpyridine-2'yl) 3,5-dimethylpyrazole
   6. Nitrobenzene — m-dinitrobenzene — m-nitroaniline — m-nitrophenol
   7. Phthalic acid — phthalic anhydride – phthalimide — Anthranilic acid
   8. Acetophenone — Benzalacetophenone — epoxide
   9. Cyclohexanone —Cyclohexanone oxime—caprolactam
   10. Phthalic anhydride—o-benzolylbenzoic acid—anthraquinone.
   11. O-Cholobenzoinc acid —N-phenylanthranilic acid —acridone.
   12. Cholrobenzene—2,4-dinitrochlorobenzene —2,4-dinitrophenol
   13. Bromobenzene—triphenylcarbinol-tritylchloride
   14. Resorcinol—resacetophenone — 4-ethyl resorcinol
   15. Resorcinol — 4-methyl-7-hydroxycoumarin — 6 and 8- nitro-4-methyl-7-hydroxycoumarin
   16. Phenol — salicylaldehyde —coumarin
   17. Aniline — 2,4,6-tribromaniline — 1,3,5-tribromobenzene
   18. Resorcinol—resacetophenone — Chalcone
   19. Any other multi step reaction as per requirement

All the students must check the progress of reaction and purity of Final products for all the stages of preparation by Thin layer Chromatography.

2. Demonstration of different software useful in Chemistry for drawing the structure of Organic compounds as well as for the computational studies of small organic molecules.

Draw the Scheme used for a multi step preparation (two or three) using any structural drawing tool & get the IUPAC name and predicted ^{1}H-NMR spectrum for each compound involved in multi step preparation.

Brief idea of given terms: Molecular graphics, Molecular minimization, Molecular Docking, Pharmacophore, QSAR, Optimization, Single point energy and Spectral analysis.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO 1 To understand the concept of stepwise synthesis of a product and their purification.

CO 2 To explore various combinations of reactions that can be exploited to form a product.

CO 3 To have a knowledge of multistep reactions the possibilities.

CO 4 Able to understand the application of structural drawing tools such as ChemAxon, ChemDraw etc. for sketching the organic compounds, finding IUPAC nomenclature, 1H NMR prediction and some useful physical properties of small organic compounds.

CO 5 To perform experimentation and evaluate the results.

CO 6 To develop the ability to compile interpreted information in the form of lab record.

CO 7 To face viva-voce.

Mapping of Paper No. CHEM- 306

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	M	S	W	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO3	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO4	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO5	S	S	M	S	M	S	M	M	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Organic Chemistry Special Practical II (CHEM-307)

1. **Quantitative estimation of the followings:** Amino group, hydroxyl group, acetoxy group, carbonyl group, unsaturation, reducing and non-reducing sugars.
2. Saponification value and iodine value of fats and oils, formalin and glycine, Determination of the molecular weight of an acid by titration and by the silver salt method.
3. Enzyme assays: Isolation and estimation of salivary Amylase and urease.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

At the end of the course the student will be able to –

CO 1 Understand the basics of quantitative analysis and application in analysis of functional groups in organic compounds.

CO 2 Analyze and estimate sugars, fats, amino acids in samples.

CO 3 Isolate, and determine enzyme activity.

CO 4 Evaluate, compile and present and explain the results.

Mapping of Paper No. CHEM-307

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	S	S	M	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	M	M	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. "Elementary Practical Organic Chemistry by Arthur I.Vogel Longmans, Green and Co. 1958.
2. "An Introduction to Practical Biochemistry", by David T. Plummr, Tata McGraw Hill Publishing Company, Ltd., N. Delhi, 1988.
3. Practical Organic Chemistry' by Mann and Saunders.
4. Text Book of Vogel's Practical Organic Chemistry by Longman Group, B.S. Furness et al., Ltd.
5. "Experiments in Organic Chemistry" Louis F. Fieser O.C. Heath and Company Boston, 1955.
6. "Organic Synthesis" Collective Vol. I.
7. “Laboratory Manual in Organic Chemistry' by R.K. Bansal, Wiley Eastern Ltd., New Delhi-1980.

Or

M.Sc. Chemistry Semester III
Pharmaceutical Chemistry Special Practical I & II
(CHEM 306 & CHEM 307)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Pharmaceutical Chemistry Special Practical I (CHEM-306)

Preparations:

1) Preparations of organic compounds of medicinal interest.
2) Techniques in isolation and extraction of crude drugs, purification of various active principles having medicinal, industrial and chemical importance.
3) Quantitative estimation of drugs in biological samples.
4) Identification of microbes on the basis of Gram staining, sterility testing, microbial assays.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To understand the concept of stepwise synthesis, to be acquainted with various combinations of reactions that can be exploited to form a product and to have experience to work under different reaction conditions.

CO2 To have practical knowledge of the isolation of active component from natural sources.

CO3 To be able to work with biological samples.

CO4 To have understanding of the microbial assays.

CO5 To perform experiments and evaluate the results.

CO6 To develop the ability to compile interpreted information in the form of lab record.

CO7 To face viva-voce.

Mapping Paper No. CHEM 306 (Practical)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Pharmaceutical Chemistry Special Practical I (CHEM-307)

Preparation and evaluation of the following : Emulsion, simple syrup, aqueous idodine solution, strong iodine solution, calamine lotion, boroglycerine, tannic acid glycerine, phenol glycerine, pipermint water, rose water, camphor water, formulation of simple and medicated ointments, magnesium hydroxide mixture (milk of magnesium), simple and complex powders, cough mixture, cold cream, vanishing cream and lotions.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To have a practical knowledge about the preparation of different dosage forms.

CO2 To prepare semi solid dosage forms-cold cream, vanishing cream and lotions.

CO3 To understand the know-how of the preparation of biphasic liquid dosage form, emulsions, by dry-gum and wet-gum method.

CO4 To prepare various Monophasic liquid dosage forms.

CO5 To perform experimentation and evaluate the results.

CO6 To develop the ability to compile interpreted information in the form of lab record.

CO7 To face viva-voce.

Mapping of Paper No. CHEM 307 (Practical)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. "A Handbook of Organic Analysis Qualitative and Quantitative" by H.T. Clarke and revised by B.Maynes, Edward Arnold (Pub.)., Ltd. London, 1975).
2. "Systematic Qualitative Organic Analysis" by H.Middleton, Edward Arnold (Publishers) Ltd., London 1959.
3. "A Text Book of Practical Organic Chemistry including Qualitative Organic Analysis" by Arthur I. Vogel, Longmans Green and Co., Ltd., London 1966.
4. "Elementary Practical Organic Chemistry" by Arthur I. Vogel, CBS Publishers & Distributors.
5. "A Guide to spectroscopy in Organic Chemistry' by PAVY
6. "Spectrometric Identification of Organic Compounds", Fifth Ed., R.M. Silverstein, G.S. Bassler and T.C.Morrile, John Wiley and Sons, New York.
7. "Organic Spectroscopy', 3rd Ed., by William Kamp. John Wiley & Sons.
8. "Spectroscopic" Methods in Organic Chemistry, D.H. William & Ian Fleming.
9. Vogel's Text Book of Practical Organic Chemistry by B.S. Furners et. al., Longman Group Ltd.

M.Sc. Chemistry Semester IV
Inorganic Chemistry Special-III (CHEM-401)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Errors and Evaluation

Definition of terms in mean and median. Precision-standard deviation, relative standard deviation. Accuracy-absolute error, relative error. Types of error in experimental data-determinate (systematic), indeterminate (or random) and gross. Sources of errors and the effects upon the analytical results. Methods for reporting analytical data. Statistical evaluation of data-indeterminate errors. Significance of the F test, the student 't' test and the Chi-test.

Nephelometry and Turbidimetry

Theory - light scattering, choice and comparison between nephelometry and turbidimetry, factors affecting measurement, instrumentation, applications

SECTION – B

Sewage and fertilizers

Sewage treatment, Biochemistry of sewage, fertilizers - Nitrogen; ammonification, nitrification, denitrification, fixation of nitrogen, biochemistry and ecology of nitrogen fixation, nitrogen and phosphorus fertilizers in agriculture, eutrophication, surfactants - cationic, anionic and non ionic, specific properties, degradation.

Analysis of air pollutants

Biochemical effect of As and Heavy metals such as Cd, Pb and Hg.

Molecular luminescence

Fluorimetry and Phosphorimetry: Introduction, principles of fluorescence and phosphorescence, interpretation of fluorescence spectra, factors, fluorescence intensity and concentration, instrumentation for fluorimetry, applications of fluorimetry.

Phosphorimetry, instrumentation, applications, comparison between fluorimetry and phosphorimetry.

SECTION – C

Chromatography

General principles, types of chromatography, absorption chromatography, partition chromatography, vapour phase chromatography, paper and thin layer

chromatography, retardation factor, retention volume, mechanism and efficiency of separations.

Ion-Exchange

General principles, ion exchangers-natural and synthetic, ion-exchange capacity, purification of water and other applications.

Solvent Extraction

General Principles, extraction coefficients, Batch, continuous, and counter current extractions, applications.

SECTION -D

Ion selective electrodes

Fundamental types of electrodes, gas sensors, ion sensors and enzyme electrodes, principle involved in measurements with ion selective electrodes with special reference to halide, sulphide and oxygen electrodes.

Thermal Techniques

Thermogravimetry, differential thermal analysis (DTA) and differential scanning calorimetry (DSC) principles and applications.

Course outcomes:

CO 1 To study the various statistical parameters used in the treatment of analytical data like types of errors, their sources and minimization along with Statistical evaluation of analytical data.

CO 2 To know the concept of naphelometry and turbidimetry and also its used in the quantitative inorganic analysis.

CO 3 To explain the sewage and its process of treatment, biochemistry and ecology of nitrogen fixation and effects of various pollutants in the air on living organisms.

CO 4 To learn about the instrumentation and phenomenon of phosphorescence and fluorescence along with various factors related with these processes.

CO 5 To discuss about the various types of chromatographic techniques and its applications.

CO 6 To learn about the ion selective electrodes and their utilization in inorganic analysis.

CO 7 To discuss about Thermogravimetry, differential thermal analysis (DTA) and differential scanning calorimetry (DSC), their principles and applications.

Mapping of Paper No. CHEM-401

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S
CO2	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S
CO3	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S
CO4	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S
CO5	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S
CO6	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S
CO7	S	S	M	S	M	S	W	M	S	M	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. A Textbook of Quantitative Inorganic Analysis, A.I. Vogel; ELBS, London.
2. Environmental Solution Analysis; S.M. Khopkar, Wiley Eastern.
3. Fundamentals of Analytical Chemistry; D.A. Skoog, O.M. West and F.J. Holler; W.B. Saunders.
4. Instrumental methods of Analysis; L.L. Merits, R.H. Willard and J.A. Dean; Van Nostrand-Reinhold.
5. Physical methods in Chemistry; R.S. Drago; Saunders.
6. Dynamics of Chromatography Part I.; J.C. Gidding; Dekker, New York.
7. Environmental Chemistry; S.K. Banerji, Prentice - Hall.

M.Sc. Chemistry Semester IV
Inorganic Chemistry Special-IV (CHEM-402)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Electro analytical methods of Analysis

Electrogravimetry: Current-voltage relationship during an electrolysis, decomposition potential, constant current electrolysis, constant cathode potential electrolysis, apparatus, electrodes, mercury cathode, applications physical properties of electrolytic precipitates, chemical factors of importance in electrodeposition.

Electrolytical methods without cathode potential control.

Coulometric analysis: Coulometric methods of constant electrode potential and coulometric titrations. Apparatus and applications.

Amperometric titrations, anodic stripping voltammetry, and cyclic voltammetry.

SECTION – B

Atomic Absorption Spectroscopy

General principles, resonance line, its natural width, Doppler effect, broadening due to pressure, Hollow cathode lamp. Application to alkali and alkaline earth metals.

Flame photometry

Theory of flame photometry, flame temperature, Emission Flame photometry - intensity of spectral lines, selection of optimum working conditions, application of flame photometry in trace metal analysis.

SECTION –C

Spectrophotometry and Colorimetry

Fundamental concepts, instrumentation for absorption measurements, interferences, application of absorption spectroscopy and Colorimetry to analysis of inogganic substance.

Nuclear magnetic Resonance

Basic Principle of NMR, Nuclear relaxation, Factors affecting nuclear relaxation, effect of chemical exchange on spectrum and evaluation of reaction

rate of fast reactions, Double resonance, Lanthanide shift reagents, an overview of NMR of other nuclides with emphasis on ^{31}P, ^{19}F, ^{195}Pt and ^{119}Sn NMR. Application in Inorganic Chemistry.

SECTION –D

Electron Spin Resonance Spectroscopy

Hyperfine coupling, spin polarization for atoms and transition metal ions, spin-orbit coupling and significance of g-tensor, application to transition metal complexes (having one unpaired electron) and inorganic free radicals such as PH_4, F_2^- and $[BH_3]^-$. Double resonance in EPR.

Circular Dichroism and Optical Rotatory Dispersion

Polarized light, fundamental symmetry requirements, for optical activity, interaction of polarized light with optically active matter, optical rotation, Cotton effect, configuration of Tris-chelated complexes.
Course outcome.

Course outcomes:

CO 1 To discuss the various electroanalytical methods of analysis viz. electrogravimetry, coulometric, cyclic voltammetry, amperometric analysis and their application in metal ions determination.

CO 2 To know the basic concept of atomic absorption spectroscopy and its application to alkali and alkaline earth metals.

CO 3 To discuss about principles of flame photometry and application of flame photometry in trace metal analysis.

CO 4 To learn about Fundamental concepts, instrumentation application of absorption spectroscopy to analysis of inorganic substances.

CO 5 To know about basic concept of NMR and its utilization in the structural determination of inorganic compounds.

CO 6 To know the concept of Circular Dichroism and Optical Rotatory Dispersion and its application to determine configuration of Tris-chelated complexes.

CO 7 To learn about ESR spectroscopy and its application in inorganic analysis.

Mapping of Paper No. CHEM- 402

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. A Textbook of Quantitative Inorganic Analysis, A.I. Vogel; ELBS, London.
2. Fundamentals of Analytical Chemistry; D.A. Skoog, O.M. West and F.J. Holler; W.B. Saunders.
3. Instrumental methods of Analysis; L.L. Merrit, R.H. Willard and J.A. Dean; Van Nostrand-Reinhold.
4. Physical methods in Chemistry; R.S. Drago; Saunders.
5. Dynamics of Chromatography Part I.; J.C. Gidding; Dekker, New York.
6. NMR, NQR, EPR and MB Spectroscopy in inorganic Chemistry, R.V. Parish, Ellis Horwood.
7. Modern Optical Methods of Analysis; E.D. Olgen; McGraw Hill.
8. Introduction to Magnetic Resonance; McLachan and Carrington; Chapman and Hall.

M.Sc. Chemistry Semester IV
Inorganic Chemistry Special-V (CHEM-403)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Metal Storage Transport and Biomineralization

Ferritin, transferrin, and siderophores.

Calcium in Biology

Calcium in living cells, transport and regulation, molecular aspects of intramolecular processes, extra cellular binding proteins, Coenzyme vitamin B12, vitamin B6.

SECTION - B

Metalloenzymes

Zinc enzymes – carboxypeptidase and carbonic anhydrase, alkaline phosphatase and alcohol dehydrogenase, Copper enzymes – superoxide dismutase. Molybdenum oxatransferase enzymes – xanthine oxidase.

SECTION - C

Supramolecular Chemistry

Concepts and language.

a) Molecular recognition: Molecular receptors for different types of molecules including anionic substrates, design and synthesis of co-receptor molecules and multiple recognition.

b) Supramolecular reactivity and catalysis.

c) Transport processes and carrier design.

d) Supramolecular devices. Some example of self-assembly in supramolecular Chemistry.

SECTION-D

Principles of Bio-Inorganic Medicine

Evaluation of modern therapeutical, means of administering chemicals to humans, concentration effects, and dose-response relationship, future developments and trends in bio-inorganic therapy.

Metals in Medicine

Metal deficiency and disease, toxic effects of metals, metals used for diagnosis and chemotherapy with particular reference to anticancer drugs.

Course outcomes:

CO1 To discuss about Metal Storage, their Transportations in living organisms and Biomineralization.

CO2 To learn about role of calcium in biological systems.

CO3 To explain structural characterstics and role of vitamin B6 and vitamin B12 in living systems.

CO4 To describe the types of zinc containing metllalloenzymes, their structure and mechanistic approach in involving various reactions occurring in living organisms.

CO5 To explain the structure and role of copper and molybdenum enzymes in biological systems.

CO6 To learn about the concept and language of supramolecular Chemistry.

CO7 To describe the various supramolecules and their role in catalysis.

CO8 To discuss the principles of bioinorganic medicines.

CO9 Describe the role of various metal in medicines with special role in anticancer drugs.

Mapping of Paper No. CHEM-403

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S	S	M	S	S	S	M	S	S	S	M
CO2	M	S	S	M	S	M	S	S	S	S	S	M	M	S	M
CO3	S	S	M	S	M	M	S	S	S	M	S	S	S	S	S
CO4	M	S	S	S	S	M	S	S	M	S	S	S	S	M	M
CO5	S	S	M	S	M	M	S	S	S	M	M	S	S	S	M
CO6	M	M	S	M	S	S	M	M	S	S	S	S	S	M	M
CO7	S	S	S	M	S	M	S	S	M	S	S	S	M	M	M
CO8	S	S	S	S	M	M	S	M	M	M	M	S	S	S	S
CO9	M	M	S	M	S	S	M	M	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
2. Bioinorganic Chemistry, I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, University Science Books.
3. Supramolecular Chemistry, J.M. Lehn, VCH.

M.Sc. Chemistry Semester IV
Inorganic Chemistry Special-VI (CHEM-404)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Photochemistry

Absorption, excitation, photochemical laws, quantum yield, electronically excited states- life times-measurements of the times. Energy dissipation by radiative and non radiative processes, bimolecular quenching, absorption spectra, Franck condon principle, photochemical kinetics, photochemical stages-primary and secondary.

SECTION – B

Excited States of Metal Complexes

Electronically excited states of metal complexes: charge-transfer spectra, charge transfer transition, photosubstitution reactions, photorearrangements, photoisomerisation, photoredox processes conditions of excited states to be useful redox reactant Illustration of some reducing and oxidising character of Ru(2+) tris-bipyramidal complex. Transformation of chemical energy into light energy.

Metal Complex Sensitizers

Metal complex sensitizer, photosensitised reactions in metal complexes, water photolysis, nitrogen fixation and carbon dioxide reduction.

SECTION – C

Solid State-I

Crystalline and non-crystalline materials, glass transition temperature Tg and melting temperature Tm, classes of compounds of the type A_2 B_3 and AB_3 Glass-ceramics, structures of polymers, glass and ceramics inorganic chains and rings.

Alloys-interstitial, substitutional and superconducting, Meissner effect, Hume-Rothery rules.

SECTION – D

Solid State-II

Perfect and imperfect crystals, intrinsic and extrinsic defects, point defects, line and plane defects, vacancies- schottky defects and Frankel defects, colour centers, non-stiochiometry and defects.

Metals, insulators and semiconductors, electronic structure of solids- band theory, band structure of metals, insulators and semiconductors. Intrinsic and

extrinsic semiconductors, doping semiconductors, p-n junctions, superconductors, Optical and Magnetic properties.

Course outcomes:

CO1 To know about basic concepts of photochemistry viz photochemical laws, quantum yield, electronically excited states, life time – measurements.

CO2 To learn about the Energy dissipation by radiative and non radiative processes along with Franck condon principle, photochemical kinetics and photochemical stages.

CO3 To explain about Electronically excited states of metal complexes and about the transformation of chemical energy into light energy.

CO4 To discuss about Metal complex sensitizer and photosensitized reactions in metal complexes.

CO5 To discuss about the Crystalline and non-crystalline materials and their properties, different type of Alloys, Meissner effect and Hume-Rothery rules for alloys.

CO6 To discuss about the various defects present in solids and to discuss about the Metals, insulators and semiconductors.

Mapping of Paper No. CHEM-404

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	W	S	M	S	S	S	S	M	M	S	S	S	S
CO2	S	S	W	S	M	S	S	S	S	M	M	S	S	S	S
CO3	S	S	W	S	M	S	S	S	S	M	M	S	S	S	S
CO4	S	S	W	S	M	S	S	S	S	M	M	S	S	S	S
CO5	S	S	W	S	M	S	S	S	S	M	M	S	S	S	S
CO6	S	S	W	S	M	S	S	S	S	M	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Concepts of Inorganic Photochemistry, A.W. Adamson and P.D. Fleischauer, Wiley.
2. Photochemistry of coordination compounds, K.Balzani and V.Carassti, Academic press.
3. Elements of Inorganic Photochemistry; G.J. Ferraudi, Wiley.
4. An Introduction to Crystal Chemistry; R.C. Evans, Cambridge University Press.
5. Introduction to solid state Physics; C.Kittel, Wiley New York.
6. Solid State Chemistry; N.B. Hannay; Prentic.

Or

M.Sc. Chemistry Semester IV
Physical Chemistry Special-III (CHEM-401)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – A

Polymers

Recapitulation and basics of polymers and polymerization. Biodegradable polymers: Types of degradable polymers, Chemical and biodegradation. Applications of biodegradable polymers, Hyperbranched–star polymers, Dendrimers, Plasticizers, Polymer composites. Properties of commercial polymers: Polyethylene, polyvinylchloride, polyamides, polyesters, phenolic resins, epoxy resins and silicon polymers.

Glass transition temperature (Tg), factors influencing the glass transition temperature, effect of molecular weight and melting point on glass transition temperature, importance of glass transition temperature.

Section – B

Thermodynamics of Polymer Solutions

Average end-to-end distance, average radius of gyration of polymer chains, statistical distribution of end-to-end dimensions, freely jointed chain in three dimensions, influence of bond angle restrictions.

Entropy of mixing and enthalpy of mixing by lattice model, Flory Huggins lattice theory, limitations of lattice model, entropy of mixing by free volume theory, heat and free energy of mixing, partial molar quantities i.e., chemical potential, heat of dilution and partial molar entropy of mixing, excluded volume, thermodynamic relations for dilute polymer solutions.

Section – C

Determination of Molecular Weight of Polymers

Molecular weight determination of polymers. Osmotic pressure: Membrane osmometer, high speed osmometer and vapour pressure osmometer. Sedimentation or ultracentrifugation: Sedimentation velocity method, sedimentation equilibrium method. Light scattering: Scattering of light by small molecules and polymer solutions, asymmetric scattering, Debye method, Zimm plot method, comparison of Zimm and Debye methods, Determination of molecular weight by Gel Permeation Chromatography.

Section – D

Advanced Statistical Mechanics

Real gases, intermolecular potential and virial coefficients.

Structure of liquids-definition of distribution and correlation functions, Thermodynamic functions of a fluid and radial distribution function, Spectroscopic techniques for liquid dynamic structure studies.

Random walk problem in 1D. Theory of Brownian motion, Langevin theory, Fokker-Planck equation.

Course outcomes:

CO1 To understand biodegradable polymers, their types and applications.

CO2 To know about the properties of commercial polymers.

CO3 To explain glass transition temperature and its importance.

CO4 To discuss about parameters of polymer chains.

CO5 To describe thermodynamic properties of mixing.

CO6 To know about thermodynamic relations for dilute polymer solutions.

CO7 To be able to explain molecular weight determination of polymers using osmotic pressure, ultracentrifugation, light scattering, Debye method, Zimm plot method and gel permeation chromatography.

CO8 To explain intermolecular potential and virial coefficients of real gases.

CO9 To discuss structure of liquids using spectroscopic techniques.

CO10 To know about thermodynamic functions of fluids.

CO11 To understand fluid dynamics from theory of Brownian motion, Langevin and Fokker-Planck equations.

Mapping Paper No. CHEM-401

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO11	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Polymer Chemistry, P.J. Flory, Cornell University Press.
2. Physical Chemistry of Polymers, A.Tager, Mir Publishers.
3. Physical Chemistry of Macromolecules, C. Tanford, Wiley Publisher.
4. Polymer Chemistry by Gowarikar, New Age International.
5. Scaling Concepts in Polymer Physics, Pierre-Gilles Gennes, Cornell University Press.
6. Introduction to Polymers, Third Edition, Robert J. Young and Peter A. Lovell, CRC Press.
7. Polymer Physics (Chemistry), M. Rubinstein, Ralph H. Colby, OUP Oxford.
8. Statistical Mechanics by Donald A Mc Quarrie, University Science Books.

M.Sc. Chemistry Semester IV
Physical Chemistry Special-IV (CHEM-402)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION-A

Solid State Chemistry

Free electron theory of metals, Quantum mechanical treatment explaining the origin of band gaps, density of states, Band theory, Bloch theorem, Brillouin zones, effective mass of charge carriers, Semiconductors: Direct and indirect band gap semiconductors, hole concept, temperature dependence of mobility and electrical conductivity, free carrier concentration in intrinsic and extrinsic semiconductors, mass active law, Generation of carriers and their recombination in semiconductors. Types of junctions (metal-semiconductor, semiconductor-semiconductor, junctions in organic materials), Analysis of p-n junction including I-V characteristics.

SECTION-B

Renewable energy sources

Renewable energy resources: Biomass-Biofuels, Hydrogen, Solar energy. Related environmental and economical issues.

Introduction to Photovoltaics. Basic PV system design. Design and physics of solar cells, I-V characteristics, external and internal quantum efficiency. Thermodynamics of light conversion. Solar radiation and conversion efficiency. Factors influencing solar cell efficiency. Future trends in PV energy conversion. Silicon solar cells, alternatives to silicon, III-V materials for solar cells, thin film solar cells and third generation solar cells. Concentrator photovoltaics. Thermodynamic limit of light concentrators, Photovoltaics storage system.

SECTION –C

Advanced Electrochemistry

Advanced concepts: Overpotential concept, Exchange current density, Butler-Volmer equation, Polarizable and non-polarizable interfaces. Tafel equations. Electrochemical Processes: Difference between kinetically and mass transport controlled electrochemical processes. Difference between single step and multiple step electrode reactions. Brief introduction and applications of various electrochemical methods: Principle of electrochemical methods such as chronoamperometry, cyclic voltammetry, chronopotentiometry, coulometry, ac-impedance, spectroelectrochemistry and hydrodynamic methods.

Electrocatalysis: Introduction to electrocatalysis. Homogeneous and heterogeneous electrocatalysis.

SECTION-D

Applied Electrochemistry

Corrosion: Forms of corrosion, Corrosion monitoring and prevention methods. Batteries and Fuel cells: Introduction. Nanostructured and surface modified electrodes: Introduction and their applications. Environmentally oriented electrochemistry: Electrochemistry of water splitting, electrolysis of sea water, electrochemical reduction of CO_2, Electrochemical sewage disposal, electrochemical decontamination of soil.

Ion Selective Electrodes

Electrical Properties of membrane, glass electrode with special reference to H^+, Na^+, K^+ ions, operation of solid membrane electrode, operation of liquid membrane electrode, coated type ion electrode, Applications of ion selective electrode in determination of some toxic metals and some anions (F^-, Cl^-, Br^-, I^- and NO_3^-).

Course outcomes:

CO1 To grasp the procedure of scientific development/understanding through various theories proposed to explain the properties of solids.

CO2 To understand quantum mechanical treatment explaining the origin of band gaps in solids.

CO3 To know about Bloch theorem, Brillouin zones, effective mass of charge carriers, hole concept.

CO4 To classify semiconductors as direct and indirect band gap materials.

CO5 To discuss free carrier concentration in different types of semiconductors and effect of temperature on electrical conductivity of semiconductors.

CO6 To describe types of junctions - ohmic and rectifying and their current-voltage characteristics.

CO7 To introduce the basics of renewable energy source.

CO8 To understand the basics of photovoltaics, thermodynamics of light conversion and factors affecting solar cell efficiency.

CO9 To follow the development of different types of solar cells and understand solar cell design.

CO10 To know about concentrator photovoltaics and photovoltaics storage system.

CO11 To introduce advanced concepts of electrochemistry including overpotential, exchange current density and Butler-Volmer equation.

CO12 To distinguish between kinetically and mass transport controlled electrochemical processes and know about principles of various electrochemical methods.

CO13 To understand electro catalysis.

CO14 To be able to understand forms, monitoring and prevention of corrosion.

CO15 To discuss electrochemical energy sources.

CO16 To introduce nano structured and surface modified electrodes.

CO17 To discuss environmentally oriented electrochemistry with examples.

CO18 To introduce, explain and discuss the applications of ion-selective electrodes.

CO19 To explain the electrical properties of glass electrode and operation of solid membrane electrode.

Mapping of Paper No. CHEM- 402

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	-	-	S	M	S	S	S	S	S
CO2	S	S	S	S	M	S	-	-	S	M	S	S	S	S	S
CO3	S	S	S	S	M	S	-	-	S	M	S	S	S	S	S
CO4	S	S	S	S	M	S	-	M	S	M	S	S	S	S	S
CO5	S	S	S	S	M	S	-	M	S	M	S	S	S	S	S
CO6	S	S	S	S	M	S	-	-	S	M	S	S	S	S	S
CO7	S	S	S	S	M	S	M	S	S	M	S	S	S	S	S
CO8	S	S	S	S	M	S	M	S	S	-	S	S	S	S	S
CO9	S	S	S	S	M	S	M	S	S	-	S	S	S	S	S
CO10	S	S	S	S	M	S	M	S	S	-	S	S	S	S	S
CO11	S	S	S	S	M	S	-	-	S	-	S	S	S	S	S
CO12	S	S	S	S	M	S	S	-	S	-	S	S	S	S	S
CO13	S	S	S	S	M	M	M	-	S	-	S	S	S	S	S
CO14	S	S	S	S	M	S	-	-	S	-	S	S	S	S	S
CO15	S	S	S	S	M	W	-	M	S	-	S	S	S	S	S
CO16	S	S	S	S	M	-	M	M	S	-	S	S	S	S	S
CO17	S	S	S	S	M	-	M	M	S	-	S	S	S	S	S
CO18	S	S	S	S	M	M	S	S	S	-	S	S	S	S	S
CO19	S	S	S	S	M	-	S	S	S	-	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Principles of the Solid State, H.V. Keer, Wiley Eastern.
2. Solid State Physics, C.Kittel, John Wiley.
3. Solid State Physics by Neil W. Ashcroft and N. David Mermin.
4. The Physics of Solar Cells (Properties of Semiconductor Materials) by Jenny Nelson.
5. Physics of Solar Cells: From Basic Principles to Advanced Concepts (Physics Textbook) by Peter Würfel.
6. Optoelectronics of Solar Cells (SPIE Press Monograph Vol. PM115), Greg P. Smestad.
7. Electrochemical Methods: Fundamentals and Applications, 2nd Ed., A. J. Bard and L. R. Faulkner John Wiley & Sons: New York, 2002.
8. Modern Electrochemistry 1: Ionics 2nd Ed., Springer (1998), J. O' M. Bockris & A. K. N. Reddy.
9. Modern Electrochemistry 2B: Electrodics in Chemistry, Engineering, Biology and Environmental Science 2nd Ed., Springer (2001), J. O' M. Bockris & A. K. N. Reddy.
10. Modern Electrochemistry 2A: Fundamentals of Electrodics 2nd Ed., Springer (2001), J. O' M. Bockris, A. K. N. Reddy and M. E. Gamboa-Aldeco.
11. Instrumental methods of analysis:Willard, Merritt & Dean.
12. Advanced Analytical Chemistry: Meiter and Thomas.
13. Instrumental methods of chemical analysis: Braun.
14. Principles of Instrumental analysis, 5th edition, D. A. Skoog, F. J. Holler, T. A. Nieman, Brooks Cole.

M.Sc. Chemistry Semester IV
Physical Chemistry Special-V (CHEM-403)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION - A

Thermal Methods of Analysis-I

Introduction to thermal analysis, TG and DTG, static, quasistatic and dynamic thermogravimetry, Instrumentation, thermogram, factors affecting thermograms, application of thermogravimetry. Reaction Kinetics–kinetics by single and multiple heating rates. Differential thermal analysis, DTA theories, DTA curves, factors affecting DTA curves, Instrumentation, applications of DTA, simultaneous determination in thermal analysis.

Differential Scanning Calorimetry (DSC)

Introduction, Instrumentation, Power compensated DSC, Heat Flux DSC, DSC-curves, factors affecting DSC curves, applications.

SECTION – B

Material Chemistry

Definition of nanomaterials, various techniques for the preparation of nanomaterials,Thermodynamics and Kinetics of Nucleation, Thin Films and Langmuir-Blodgett films - Preparation techniques, evaporation/sputtering, chemical processes, MOCVD, sol-gel. Langmuir-Blodgett (LB) film, growth techniques, photolithography, properties and applications of thin and LB films.

Electronic structure and properties of nanomaterials, optical, electrical and magnetic properties, diffusion and chemical behaviour, applications of nanomaterials.

SECTION – C

Photochemistry

Revision of basic concepts of photochemistry, Life times of excited electronic states of atoms and molecules. Charge transfer transitions.

The Frank-Condon principle, emission spectra, environment effect on absorption and emission spectra, Wigner's spin conservation rule.Modes of decay of excited states, quenching of fluorescence, delayed fluorescence, collisional quenching, Stern–Volmer equation. Excimer and exciplex formation and decay.

Techniques for the study of transient species in photochemical reactions. Applications of Lasers in photochemical kinetics.

SECTION – D

Biophysical Chemistry

Chemical bonds in biological systems; Properties of water; Thermodynamic principles in biological systems; Osmotic pressure, membrane equilibrium, muscular contraction and energy generation in mechanochemical system. Introduction to protein folding problem.Cell Membrane and Transport of Ions: Structure and functions of cell membrane. Active transport across cell membrane, irreversible thermodynamics treatment of membrane transport.

Optical methods and applications: Optical techniques in biological systems: Absorption spectroscopy, Fluorescence spectroscopy, Linear and Circular Dichroism.

Course outcomes:

CO1 To know about details of Thermogravimetry (TG) technique and its applications.

CO2 To discuss Differential thermal analysis (DTA), its theory, instrumentation and applications.

CO3 To explain Differential scanning calorimetry and its applications.

CO4 To discuss preparation of nanomaterial through various techniques.

CO5 To be able to explain thermodynamics and kinetics of nucleation.

CO6 To know about preparation of thin films and Langmuir-Blodgett films and their applications.

CO7 To explain photolithography.

CO8 To discuss electronic structure and properties of nanomaterials and applications of nanomaterials.

CO9 To know about the fundamentals of photochemistry.

CO10 To explain absorption and emission spectra and environmental effects.

CO11 To discuss modes of decay of excited states.

CO12 To describe formation and decay of excimer and exciplex

CO13 To discuss the techniques for studying transient species in photochemical reactions.

CO14 To be able to discuss applications of Lasers in photochemical kinetics.

CO15 To discuss about thermodynamics principles in biological systems.

CO16 To know about muscular contraction and energy generation in mechanochemical system.

CO17 To discuss protein folding problem.

CO18 To explain structure and functions of cell membranes and treatment of membrane transport using irreversible thermodynamics.

CO19 To describe optical techniques in biological systems.

Mapping of Paper No. CHEM -403

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	M	S	M	S	S	S	M	S
CO6	S	S	S	S	S	S	S	M	S	M	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO8	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S
CO9	S	S	S	S	S	S	M	S	S	S	S	S	S	M	S
CO10	S	S	S	S	S	S	S	S	S	S	M	S	S	S	S
CO11	S	S	S	S	S	M	M	M	S	S	M	S	M	M	S
CO12	S	S	S	S	S	S	S	M	S	S	M	S	M	M	S
CO13	S	S	S	S	M	S	S	M	S	S	S	S	S	S	S
CO14	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO15	S	M	S	S	S	S	M	M	S	S	M	M	S	M	S
CO16	S	M	S	S	S	S	S	S	S	S	M	S	S	M	S
CO17	S	M	S	S	S	S	S	M	S	S	M	M	S	M	S
CO18	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO19	S	S	S	S	S	S	S	M	S	M	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Handbook of Thermal Analysis and Calorimetry; M. E. Brown.
2. Fundamentals of Photochemistry, K.K. Rohtagi & Mukherjee, Wiley Eastern.
3. Photochemistry, J.G. Calvert and J.N. Pitts, Wiley.
4. Photochemistry and Spectroscopy, J.P. Simons, Wiley Interscience.
5. Principles and Applications of Photochemistry by Brian Wardle.

6. Instrumental methods of analysis:Willard, Merritt & dean.
7. Advanced Analytical Chemistry: Meiter and Thomas.
8. Instrumental methods of chemical analysis: Braun.
9. Principles of Biochemistry, A.L.Lehninger, Worth Publishers.
10. Biochemistry, L.Stryer, W.H.Freeman.
11. Biochemistry, J.David Rawn, Neil Patterson.
12. Biochemistry, Voet and Voet, John Wiley.
13. Outlines of Biochemistry, E.E.Conn and P.K.Stumpf, John Wiley.
14. Bioorganic Chemistry: A Chemical Approach to Enzyme Action, H.Dugas and C. Penny, Springer-Verlag.
15. Macromolecules: Structure and Function, F.Wold, Prentice Hall.
16. Biophysical Chemistry, Vol. 1-3, C. R. Cantor & Schimmel.
17. Physical Biochemistry: Applications to Biochemistry and Molecular Biology by D. M. Freifelder.
18. Biophysical Chemistry: Principles and Techniques by A. Upadhyay, Himalaya Publishing House.

M.Sc. Chemistry Semester IV
Physical Chemistry Special-VI (CHEM-404)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION-A

Advanced Chemical Kinetics

London-Eyring-Polanyi method of calculation of energy of activation. Sato Method and Bond-Energy-Bond-Order (BEBO) Method, Application of activated complex theory of reaction rates. Temperature dependence of pre-exponential factor. Statistical distribution of molecular energies, Kassel's theory (RRK), Rice-Ramsperger-Kassel-Marcus (RRKM) theory, unimolecular reactions and its validity.

SECTION-B

Reaction Dynamics

Molecular beams, principle of crossed-molecular beams. Molecular encounters and principal parameters, e.g. Impact parameter, Collision cross-section, Reaction cross-section and relation between reaction cross-section and reaction rate (single velocity). Dependence of collisional cross-section on translational energy.

Solution Kinetics

Ion-ion reaction, ion-dipole reaction and enzyme kinetics (effect of pH and temperature). Lineweaner-Burk plot for the analysis of enzymolysis. Reactions between polar molecules, kinetic salt, salt effect.

SECTION-C

Kinetics of Fast Reactions

General treatment of chain reaction, apparent activation energy of chain reactions, chain lengths, theories of branching chain and explosion (hydrogen-oxygen reaction). Modern techniques in gas phase and in solution, flash photolysis, flow methods, relaxation techniques (temperature jump, pressure jump) and shock tube technique.

SECTION-D

Liquid Crystals

Mesmorphic behaviour, thermotropic liquid crystals, positional order, bond orientational order, nematic and smectic mesophases; smectic – nematic transition and clearing temperature – homeotropic, planar and schlieren textures, twisted nematics, chirals nematics, molecular arrangement in smectic

A and smectic C phases, optical properties of liquid crystals. Dielectric susceptibility and dielectric constants. Lyotropic phases and their description of ordering in liquid crystals.

Course outcomes:

CO1 Be able to explain London-Eyring-Polanyi method of calculation of energy of activation.

CO2 To describe Sato method and BEBO method to determine activation energy.

CO3 To know about applications of activated complex theory of reaction rates.

CO4 To discuss dependence of pre-exponential factors on temperature.

CO5 To explain validity of unimolecular reaction.

CO6 To know about Rice-Ramsperger-Kassel (RRK) theory of unimolecular reactions and Marcus extention (RRKM) of RRK theory.

CO7 To discuss principle of crossed-molecular beams, molecular encounters and principal parameters.

CO8 To explain dependence of collisional cross-section on translational energy.

CO9 To be able to discuss ion-ion and ion-dipole reactions in solutions.

CO10 To describe enzyme kinetics.

CO11 To discuss fundamental concepts of chain reactions.

CO12 To explain theories of branching chain and explosion reactions.

CO13 To know about the techniques of studying fast reactions in gas phase and in solution i.e., flash photolysis, flow methods, relaxation techniques and shock tube technique.

CO14 To discuss the mesomorphic behaviour of substances and to know the meaning of thermotropic liquid crystals.

CO15 To describe types of liquid crystals including nematic, smectic, chiral nematics and lyotropic phases.

CO16 To know about the homeotropic and schlieren textures of liquid crystals.

CO17 To explain optical and dielectric properties of liquid crystals.

Mapping of Paper No. CHEM-404

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO9	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO10	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO11	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO12	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO13	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO14	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO15	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO16	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO17	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Theoretical Chemistry, S. Glasstone, Affiliated East-West Press.
2. Micelles, Theoretical and Applied Aspects, V. Moroi, Plenum.
3. Material Science Engineering, W.D. Callisler, Jr.
4. Chemical Kinetics, K.J. Laidler, McGraw Hill
5. Theories of Chemical Reaction Rates, K.J. Laidler, McGraw Hill.
6. Theory of Rate Processes, S. Glasstone, K.J. Laidler and H. Eyring, McGraw Hill.
7. Reaction Kinetics Oxford Press (1997), M. J. Pilling and P. W. Seakins.
8. Thermotropic Liquid Crystals, G.W. Gray, John Wiley.
9. Handbook of Liquid Crystals, Kelkar and Hatz, Chemie Verlag.
10. Significance of liquid structures, H. Eyring.

Or

M.Sc. Chemistry Semester IV

Organic Chemistry Special-III (CHEM-401)

Credits-4 **Total Marks = 80**

Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all, selecting at least one question from each section. All questions carry equal marks.

SECTION - A

Disconnection Approach-I

An introduction of synthons and synthetic equivalents, general principles of the disconnection approach, functional group interconversions, the importance of order of events in organic synthesis, one group C-X and two group C-X disconnections, one group C-C disconnection, chemoselectivity, regioselectivity, regiospecificity, stereoselectivity and stereospecificity.

SECTION - B

Disconnection Approach-II

Reversal of polarity, amine synthesis, use of Wittig reagents, use of acetylene and aliphatic nitro compounds in organic synthesis, synthesis of three membered rings, photochemistry in organic synthesis-synthesis of four membered rings, uses of ketenes in organic synthesis, synthesis of five and six membered rings.

SECTION - C

Disconnection Approach-III

Principle of protection of alcoholic, amino, carbonyl and carboxylic groups, Two group C-C disconnection- Diels Alder reactions, 1,3-difunctionalized compounds and α,β-unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalized compounds-Michael addition and Robinson Annelation.

SECTION – D

Application of Disconnection

A brief survey of various approaches used towards the synthesis of Juvabione and their relative merits and demerits, Sarette's stereospecific synthesis of Cortisone.

Principle of Green chemistry and its applications

Basic Principle and need of green chemistry, Different tools for green synthesis (Elementary idea of green reagent, green solvent, green catalyst, solid phase, mw and ultrasound assisted) atom economy, synthesis involving basic principle of green chemistry-synthesis of adipic acid and BHC synthesis of Ibuprofen.

Aromaticity

Concept of aromaticity, non-aromaticity, anti-aromaticity, homoaromaticity, and psuedo-aromaticity. Aromaticity in charged rings, HMO and PMO for determining aromatic, non-aromatic and anti-aromatic character of annulenes having various π-electron systems, application of ^{1}H-NMR in determining aromatic character of annulenes.

Course Outcomes:

CO1 After completion of course the students will be able to apply the concepts of Disconnection approach and Green chemistry for the synthesis of different target molecules in organic chemistry.

CO2 To have knowledge about various terms used in disconnection approach like synthons, synthetic equivalents, functional group interconversions and importance of order of events.

CO3 To know about one group C-X and two group C-X disconnections, one group C-C disconnection.

CO4 To understand the practical aspects of chemoselectivity, regioselectivity, regiospecificity, stereoselectivity and stereospecificity.

CO5 To understand the concept of reversal of polarity and amine synthesis.

CO6 To know the application of wittig reagents and acetylene for the synthesis of alkenes.

CO7 To understand application of aliphatic nitro compounds in organic synthesis.

CO8 To learn about different strategies for the synthesis of three, four, five and six membered rings.

CO9 To explore the use of ketenes in organic synthesis.

CO10 To explore two group C-C disconnection utilizing Diels Alder reactions, 1,3-difunctionalized compounds, unsaturated carbonyl compounds, 1,5-difunctionalized compounds, Michael addition and Robinson Annelation.

CO11 To know the strategy about control in carbonyl condensations.

CO12 To understand the principles of protection and deprotection approach in synthetic organic chemistry with special reference of alcoholic, amino, carbonyl and carboxylic groups.

CO13 To apply the tools of retero-synthesis for the synthesis of natural products like Juvabione and Cortisone.

CO14 To understand the need of green chemistry and its principles.

CO15 To have an elementary idea of green reagent, green solvent, green catalyst, solid phase, mw and ultrasound assisted.

CO16 To know the concept of atom economy for different types of reactions.

CO17 To apply concepts of green chemistry for the synthesis of Adipic acid and Ibuprofen.

CO18 To understand the concept of aromaticity and various criteria of aromaticity.

Mapping of Paper No. CHEM-401 Organic Chemistry Special-III

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO2	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO3	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO4	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO6	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO7	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO8	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO9	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO10	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO11	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO12	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO13	S	S	M	S	S	S	M	S	M	M	S	S	S	S	S
CO14	S	S	S	S	S	S	M	S	M	M	S	S	S	S	S
CO15	S	S	S	S	S	S	M	S	M	M	S	S	S	S	S
CO16	S	S	S	S	S	S	M	S	M	M	S	S	S	S	S
CO17	S	S	S	S	S	S	M	S	M	M	S	S	S	S	S
CO18	S	W	M	S	S	S	M	M	M	M	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Designing Organic Synthesis, S.Warren, Wiley.
2. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge Univ. Press.
3. Handbook of Green Chemistry- Green Catalysis- Paul T. Anastas, Robert H. Crabtree, Wiley-VCH.

4. Methods and Reagents for green synthesis: An introduction, Pietro Tundo, Alvise Perosa, F. Zecchin, Wiley.
5. Polycyclic Aromatic Hydrocarbons, E. Clar, Academic Press.
6. Advanced Organic Chemistry Reactions, Mechanisms and Structures, J. March, Wiley.
7. Advanced Organic Chemistry Part B. F.A. Carey and R.J. Sundberg, Plenum Press.

M.Sc. Chemistry Semester IV
Organic Chemistry Special-IV (CHEM-402)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Reactions

A detailed study including mechanism or Arndt-Eistert synthesis Beckmann, Hofmann, Curtius, Lossen, Schmidt, Favorskii, Neber, Fritsch-Butenberg-Wiechell, Baeyer-Villiger, Benzilbenzillic acid rearrangements.

SECTION – B

Reactions

A detailed study including mechanism of Darzens synthesis, stroke enamine synthesis, Shapiro reaction, Sharplcss asymmetric epoxidation, Prevost and Woodward hydroxylation.

Flavonoids

Occurrence, nomenclature, general methods (chemical and spectroscopic) of structure determination of flavonoids. Isolation, structure elucidation and synthesis of Cyanin, Quercetin, Diadzein and Chrysin. Biosynthesis of Flavonoids: Acetate and Shikimic acid pathway, biosynthesis of catechin.

SECTION – C

Heterocyclic compounds

Systematic (Hantzsch-Widman) nomenclature for monocylic and fused ring systems.

General synthesis and reactions (including mechanism) of the followings:

Three-membered heterocycles: oxirane, azirene, oxazirane, diaziridines

Four-memebered heterocycles: Oxetane and azetidine.

SECTION – D

Heterocyclic compounds

General synthesis and reactions (including mechanism) of the followings:

Five-membered heterocycles: pyrazole, imidazole, oxazole, isoxazole, thiazole, isothiazole; Comparison of their basic character.

General synthesis and reactivity of purines and pyrimidines.

Course Outcomes:

CO 1 After completing this course, the student will know various name reactions, aspects of heterocyclic chemistry and flavonoids.

CO 2 Get to know mechanistic details of Arndt-Eistert synthesis Beckmann, Hofmann, Curtius, Lossen, Schmidt, Favorskii, Neber, Fritsch-Butenberg-Wiechell, Baeyer-Villiger, Benzilbenzillic acid rearrangements.

CO 3 To understand mechanistic details of Darzens synthesis, stroke enamine synthesis, Shapiro reaction; Sharplcss asymmetric epoxidation, Prevost and Woodward hydroxylation.

CO 4 To understand general aspects of isolation and degradative and synthetic aspects of structure elucidation of flavonoids.

CO 5 To apply this knowledge for structure elucidation and synthesis of Cyanin, Quercetin, Diadzein and Chrysin.

CO 6 To understand Biosynthetic Acetate and Shikimic acid pathway leading to production of Flavonoids and catechin.

CO 7 To be familiar with systematic (Hantzsch-Widman) nomenclature for monocylic and fused ring systems.

CO 8 To understand the method of synthesis and the chemical reactions of three and four membered heterocyclic compounds such as oxirane, azirene, oxazirane, diaziridines, Oxetane and azetidine.

CO 9 To understand basic character, methods of synthesis and Reactions with mechanistic details of pyrazole, imidazole, oxazole, isoxazole, thiazole, isothiazole.

CO 10 To understand the general method of synthesis and chemical reactions of purines and pyrimidines.

Mapping of Paper No. CHEM-402

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	M	M	S	W	M	S	S	S	S
CO2	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO3	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO4	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO5	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO6	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO7	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO8	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO9	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S
CO10	S	S	M	S	M	S	M	M	S	W	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Designing Organic Synthesis, S.Warren, Wiley.
2. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge Univ. Press.
3. Modern Synthetic Reactions, H.O. House, W. A. Benzamin.
4. Advanced Organic Chemistry Reactions, Mechanisms and Structures, J. March, Wiley.
5. Advanced Organic Chemistry Part B. F.A. Carey and R.J. Sundberg, Plenum Press.
6. Organic Chemistry, Vol. 2, I.L. Finar, ELBS.
7. Heterocylic Chemistry, T.L. Gilchrist, Longman Scientific Technical.
8. Comprehensive Heterocyclic Chemistry, A.R. Katritzky and C.W. Rees, eds. Pergaman Press.
9. Handbook of Heterocyclic Chemistry, Alan Katritzky, Christopher Ramsden, John A. Joule and Viktor Zhdankin, 3rd Edition, Elsevier.

M.Sc. Chemistry Semester IV
Organic Chemistry Special-V (CHEM-403)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Enzymes

Introduction and historical perspective, chemical and biological catalysis, remarkable properties of enzymes like catalytic power, specificity and regulation. Nomenclature and classification, extraction and purification. Fischer's lock and key and Koshland's induced fit hypothesis, concept and identification of active site by the use of inhibitors, affinity labeling. Enzyme kinetics, Michaelis-Menten and Lineweaver-Burk plots, reversible and irreversible inhibition.

Mechanism of Enzyme Action

Transition-state theory, orientation and steric effect, acid-base catalysis, covalent catalysis, strain or distortion

SECTION – B

Mechanism of action of chymotrypsin, papain and carboxypeptidase A.

Co-enzyme Chemistry

Cofactors as derived from vitamins, coenzymes, prosthetic groups, apoenzymes. Structure and biological functions of coenzyme A, thiamine pyrophosphate (TPP), pyridoxal phosphate (PLP), NAD^+, $NADP^+$, FMN, FAD. Mechanisms of reactions catalyzed by the above cofactors.

Prostaglandins: General Introduction, nomenclature and biological roles of prostaglandins. Synthesis of PGE_2 and $PGF_{2\alpha}$.

SECTION - C

Terpenoids

General aspects of structure determination of terpenoids. Structure elucidation and synthesis of Geraniol, α-terpineol, α-pinene, camphor, farnesol and squalene. Biogenetic isoprene rule and biogenesis of terpenoids.

SECTION – D

Steroids

Isolation and nomenclature of steroids. Structure elucidation, synthesis (Woodward) and stereochemistry of cholesterol.

Methods for the following conversions.

i) Cholesterol → Testosterone

ii) Cholesterol → Progesterone

iii) Cholesterol → 5-α and 5-β cholanic acids.

Johnson's hydrochrysene approach towards the synthesis of Androsterone.

Course outcomes:

After completing this course the student will get to know about enzymes, coenzymes, terpenoids and cholesterol. The course outcomes are -

CO1 To understand chemical and biological catalysis, nomenclature and classification, of enzymes, extraction and purification of enzymes, Fischer's lock and key and Koshland's induced fit hypothesis.

CO2 To understand kinetics of Enzyme catalyzed reactions, Michaelis-Menten and Lineweaver-Burk plots and kinetics of reversible and irreversible inhibition.

CO3 To be familiar with mechanisms of enzyme catalyzed reactions, Transition-state theory, orientation and steric effect, acid-base catalysis, covalent catalysis, strain or distortion. To understand mechanism of action of chymotrypsin, carboxypeptidase A and papain

CO4 To get knowledge about Cofactors as derivatives of vitamins. knowledge of coenzymes, prosthetic groups, apoenzymes. structure and biological functions and mechanisms of reactions catalyzed by coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD^+,$NADP^+$, FMN, FAD, by the above cofactors. Nomenclature and biological roles of prostaglandins, synthesis PGE_2 and $PGF_{2\alpha}$.

CO5 To understand definition and classification of terpenoids, isoprene and special isoprene rule, general methods of structure elucidation of terpenoids.

CO6 To apply the acquainted knowledge for structure elucidation and synthesis of Geraniol,α-terpineol, α-pinene, camphor, farnesol and squalene, biogenetic isoprene rule and biosynthesis of terpenoids.

CO7 To know about steroids and their classification, Isolation and nomenclature, structure elucidation, synthesis and stereochemistry of cholesterol.

CO8 To the understand synthetic pathways of testosterone, progesterone, 5α- and 5β-cholanic acids from Cholesterol. Johnson's hydrochrysene approach for the synthesis of androsterone.

Mapping of Paper No. CHEM-403

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO 1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 6	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 7	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S
CO 8	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Organic Chemistry, Vol 2, I. L. Finar, ELBS.
2. Natural Products: Chemistry and Biology Significance, J.Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthrope and J.B. Harborne, Longman, Essex.
3. Biochemistry, A.L. Lehninger.
4. Outlines of Biochemistry, Cohn & Stumpf.

M.Sc. Chemistry Semester IV
Organic Chemistry Special-VI (CHEM-404)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Drug Design

Classification and discovery of new drugs, history and development of chemotherapeutic agents, therapeutic index, LD50 and ED50, naming of (new) drugs.

Elementary idea about drug action: the receptor role, neurotransmitters and receptors, ion channels and their control. Membrane bound enzymes-activation/deactivation. Chemical basis of messenger induced change of shape by the receptor. Design of agonists, antagonists and partial agonists.

Drug development: Screening of natural products, isolation and purification, structure determination, structure-activity relationships (SAR), synthetic analogues, isosteres and bioisosteres, concept of lead compounds.

Brief overview of pharmacokinetics and pharmacodynamics, concept of prodrug and synergism.

SECTION – B

Synthesis, General Mode of Action and Medicinal Uses of Important Drugs in the Following Categories.

Antineoplastic Agents: Mechlorethamine, Chlorambucil, cyclophosphamide, carmustine, aminopterin, 6-mercaptopurine, paclitaxel (synthesis of paclitaxel excluded).

Antimalarials: Chloroquine, primaquine, chloroguanide, pyrimethamine.

Analgesics, Antipyretics and Antiinflammatory agents: Morphine and related compounds (codeine and heroin), meperidine, methadone, aspirin, acetaminophen, indomethacin, phenylbutazone, mefenamic acid, ibuprofen, diclofenac, naproxen, celecoxib.

Antifertility agents: Ovulation inhibitors and related hormonal contraceptives - norethindrone, norethynodrel, estradiol, mestranol, non hormonal contraceptive- centchroman (synthesis of all the drugs excluded).

Cardiovascular Drugs: Calcium channel blockers and □-blockers: sorbitrate, diltiazem, atenolol and verapamil.

AIDS and drugs against HIV: HIV infection to the system, structure and mode of action of important drugs against HIV (nucleoside reverse transcriptase inhibitors) - AZT, ddI, ddC, d4T and 3TC (synthesis only of AZT).

SECTION – C

Antibiotics

Cell wall biosynthesis and protein synthesis inhibitors: Penicillins and semi-synthetic penicillins. synthesis, structure elucidation and medicinal uses of penicillin G, problems of sensitivity to acids, □-lactamases and narrow spectrum of activity, solving these problems leading to the development of penicillin V, oxacillin, cloxacillin, ampicillin, amoxicillin, carbenicillin and carfecillin.

Cephalosporins - Discovery, structure elucidation and synthesis of cephalosporin-C.

SECTION – D

Alkaloids

Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on nitrogen heterocyclic ring, role of alkaloids in plants.

Structure, stereochemistry, synthesis and biosynthesis of the following: Ephedrine, (+)-Coniine, Nicotine, Quinine and Reserpine.

Course outcomes:

At the end of the course, the students would be able to:

CO1 Demonstrate understanding of the basic principles of drug action, design and the terminology involved therein.

CO2 Apply the knowledge of drug design in developing new drugs using rational approach to drug design.

CO3 Explain synthesis, general mode of action and medicinal uses of listed classes of drugs.

CO4 Describe synthesis, structure elucidation and medicinal uses of penicillins and cephalosporins as cell wall biosynthesis and protein synthesis inhibitors.

CO5 Relate physiological action of alkaloids and their classification based on nitrogen heterocyclic ring.

CO6 Appreciate general aspects of isolation and structure elucidation of alkaloids for application in structure elucidation, synthesis and biosynthesis of listed alkaloids.

Mapping of Paper CHEM-404

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	W	S	S	S	S	M	M	S	S	S	S
CO2	S	S	S	S	W	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	W	S	M	S	S	M	M	S	S	S	S
CO4	S	S	S	S	W	S	M	S	S	m	M	S	S	S	S
CO5	S	S	S	S	W	S	M	M	S	W	M	S	S	S	S
CO6	S	S	S	M	W	S	M	M	S	W	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Ed. Robert F. Dorge.
2. Burger's Medicinal Chemistry and Drug Discovery Vol-I Ed. M.E. Wolf, John Wiley.
3. Goodman and Gilman's Pharmacological Basis of Therapeutics, McGraw-Hill.
4. Organic Chemistry Vol.-2 I.L. Finar, ELBS.
5. Natural Products: Chemistry and Biology Significance, J.Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthrope and J.B. Harborne, Longman, Essex.

Or

M.Sc. Chemistry Semester IV

Pharmaceutical Chemistry Special-III (CHEM-401)

Credits-4 **Total Marks = 80**

Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Mechanistic and biosynthetic approach to plant secondary metabolites: Acetate-malonate pathway: Biosynthesis of plant fatty acids, biosynthesis and oxidation of ricinoleic acid). Polyketides: Biosynthesis of 6-methylsalicyclic acid, pencillic acid, griseofulvin.

Acetate- mevalonate pathway: Biosynthesis of psoralen, gibberellic acid, cholesterol, conessine.

Shikimic-acid pathway: Biosynthesis of chlorogenic acid and cichoriin, Cyanin, Quercetin, Biosynthesis of Porphyrins.

SECTION – B

Alkaloids: Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on nitrogen heterocyclic ring, role of alkaloids in plants.

Structure, synthesis, biosynthesis and biological importance of the following: Ephedrine, (+)-Coniine, Nicotine, Quinine and Reserpine.

Carotenoids; Structure, synthesis and biogenesis of β-carotene and Vitamin-A.

SECTION – C

Carbohydrates: Introduction, stereoisomerism, mutarotation of monosaccharides, ring structure of glucose, structure elucidation, of disaccharides, sucrose, maltose, lactose, polysaccharides, starch, glycosides, general structure elucidation.

Terpene: General introduction, isoprene rule, isolation of terpenes, General methods of structure determination of terpenes, structure elucidation of citral, menthol and camphor.

SECTION – D

Steroids: Isolation, nomenclature, structural elucidation with special reference to Cholesterol, ergosterol and cardiac glycosides

Methods for the following conversions:

i) Cholesterol → Testosterone

ii) Cholesterol → Progesterone

Porphyrins

Structures elucidation of chlorophyll, General structural features of haemoglobin (not structure elucidation).

Course outcomes:

The course will provide details of biosynthetic and synthetic pathways for natural products -

CO1 To know the details of the biosynthetic pathways for plant secondary metabolism, acetate-malonate pathway, Acetate-mevalonate pathway, shikimic acid pathway.

CO2 To elaborate importance of alkaloids including general methods of structure elucidation, role of alkaloids in plants, synthesis, biosynthesis and biological importance of ephedrine, (+)-coniine, nicotine, quinine and reserpine.

CO3 To discuss carotenoids- β-carotene and vitamin-A.

CO4 To have knowledge of carbohydrate chemistry- stereoisomerism, monosaccharides (glucose), disaccharides (sucrose, maltose, lactose), polysaccharides (starch), glycosides.

CO5 To understand terpenoids- isoprene rule, General structure determination of acyclic (citral), monocyclic (menthol) and bicyclic (camphor) members.

CO6 To learn about steroids discussing nomenclature, structural elucidation (Cholesterol), ergosterol and cardiac glycosides.

CO7 To inform about porphyrin compounds-chlorophyll, haemoglobin.

Mapping of Paper No. CHEM-401

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	S	S		S	S	S	S	S	M	S	W	S
CO2	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Organic Chemistry, Vol 2, I. L. Finar, ELBS.
2. Natural Products: Chemistry and Biology Significance, J.Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthrope and J.B. Harborne, Longman, Essex.

M.Sc. Chemistry Semester IV
Pharmaceutical Chemistry Special-IV (CHEM-402)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Drug Design

Introduction, Procedure followed in drug design-Screening of natural compounds, isolation, purification, structure determination, Search for lead Compounds, Molecular Modification of Lead Compound, prodrugs- utility, drug latentiation, carrier linked and bioprecursor prodrugs, Prodrugs of compounds containing alcohols, carboxylic acids, amines and carbonyl groups, drug synergism, hard and soft drugs. Structure-Activity Relationship (SAR), isosterism, Bioisosterism, Factors affecting Bioactivity, Theories of Drug Activity; Occupancy theory, Rate theory, Induced Fit theory

SECTION – B

Quantitative structure-activity relationships (QSAR)

Development of QSAR, Physicochemical parameters- Lipophilicity parameter, Polarizability, Electronic parameter, Ionization Constants, steric Parameters- Taft's steric factor, molar refractivity, Verloop steric parameter, chelation parameters, Surface activity parameter, redox potential, hansch analysis, Craig plot, Topliss Scheme, Free-Wilson Approach.

Co-Enzyme Chemistry

Cofactors as derived from vitamins, coenzymes, prosthetic groups, apoenzymes. Structure and biological functions of coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD^+, $NADP^+$, FMN, FAD, Mechanisms of reactions catalyzed by the above cofactors.

SECTION – C

Combinatorial Chemistry

Introduction to Combinatorial chemistry, Combinatorial approaches, solid phase techniques, liquid phase synthesis, Chemical Peptide and small molecular libraries, split synthesis and parallel synthesis- applications and methodology, deconvolution, Combinatorial Organic Synthesis.

High throughtput screening (HTS), Planning and designing a combinatorial synthesis-scaffolds, X-ray crystallography, docking procedures.

SECTION – D

Enzymes

Introduction and historical perspective, chemical and biological catalysis, remarkable properties of enzymes like catalytic power, specificity and regulation. Nomenclature and classification, extraction and purification. Fischer's lock and key and Koshland's induced fit hypothesis, concept and identification of active site by the use of inhibitors, affinity labeling. Enzyme kinetics, Michaelis-Menten and Lineweaver-Burk plots. Enzyme inhibitors- reversible, irreversible, suicide inhibitors.

Mechanism of Enzyme Action.

Transition-state theory, orientation and steric effect, acid-base catalysis, covalent catalysis, strain or distortion.

Course outcomes:

The content of the paper is designed to enrich the knowledge of the students about designing of drugs, enzymes, co-enzymes and important concepts necessary to know for drug design like SAR, QSAR, combinatorial chemistry, HTS, X-Ray and docking -

CO1 To know about the procedure followed in drug design.

CO2 To have in-depth knowledge of lead compounds and their modification.

CO3 To inform concepts of prodrugs-drug latentiation, carrier linked- & bioprecursor prodrugs, Prodrugs of molecules containing alcohols, carboxylic acids, amines and carbonyl groups.

CO4 To educate about importance of drug synergism.

CO5 To grip hard and soft drug concept.

CO6 To enlighten about structure-activity relationship.

CO7 To make understand significance of isosterism & bioisosterism.

CO8 To be acquainted with important theories of drug activity-occupancy, rate, induced-fit.

CO9 To offer details of quantitative structure-activity relationship and its parameters- lipophilicity, polarizability, electronic, ionization, steric chelation, surface activity.

CO10 To be familiar with redox potential, hansch analysis, craig plot, topliss scheme, free-wilson approach.

CO11 To be informed about co-enzymes and related terms- Cofactors, prosthetic groups, apoenzymes, coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD^+, $NADP^+$, FMN, FAD (mechanisms of reactions catalyzed by the cofactors).

CO12 To explain combinatorial approaches, molecular libraries, solid- & liquid-phase procedures, split & parallel synthesis.

CO13 To gain the idea of the following techniques- high throughput screening, X-ray, docking.

CO14 To elaborate the basics of enzymes-nomenclature and classification, extraction, purification. chemical & biological catalysis, catalytic power, specificity, regulation, acid-base & covalent catalysis.

CO15 Fischer's lock and key & Koshland's induced fit hypothesis.

CO16 Enzyme kinetics-Michaelis-Menten and Lineweaver-Burk plots.

CO17 Enzyme inhibitors- reversible, irreversible, suicide inhibitors.

CO18 Mechanism of enzyme Action-Transition-state theory.

Mapping of CO Paper No. CHEM 402

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO4	S	S	S	S	S	M	M	S	S	S	S	M	S	M	S
CO5	S	S	S	S	S	M	M	S	S	S	S	M	S	M	S
CO6	S	S	S	S	S	W	M	S	S	S	S	M	S	M	S
CO7	S	S	S	S	S	S	W	S	S	S	S	M	S	M	S
CO8	S	S	S	S	S	S	W	S	S	S	S	M	S	M	S
CO9	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO10	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO11	S	S	S	S	S	S	W	S	S	S	S	M	S	M	S
CO12	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO13	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO14	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO15	S	S	S	S	S	S	S	S	S	S	S	M	S	M	S
CO16	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO17	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
CO18	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. An Introduction to Medicinal Chemistry, G. L. Patrick, Oxford University Press.
2. Medicinal Chemistry, An Introduction, G. Thomas, John Wiley.
3. Principles of Biochemistry, A. L. Lehninger, Worth Publishers.
4. Outlines of Biochemistry, E. E. Conn and P. K. Stumpf, John Wiley.
5. Enzymes: Biochemistry, Biotechnology and Clinical Chemistry, T. Palmer, Woodhead Publishers.

M.Sc. Chemistry Semester IV
Pharmaceutical Chemistry Special-V (CHEM-403)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Intellectual Property Rights - I

Introduction - IPR, GATT, WTO.

TRIPs – Its scope and options, the changing R & D processes and IPR, The IPR tool kit.

Patents – Definition, types, the patenting process, patent cooperation treaty, conditions to be satisfied by an invention to be patentable, features.

Intellectual Property Protections of Living Species – Compatibility between conventions, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, some case studies.

SECTION – B

Intellectual Property Rights - II

Exercising and Enforcing of Intellectual Property Rights - Rights of an IPR owner, licensing agreements, criteria for patent infringement, case studies of patent infringement, IPR – a contract, unfair competitions and control, provisions in TRIPs, some case studies.

Patent Laws - Introduction, Salient features of "The Patents Act 1970" , "The Patent Rules 2003" and "The Patent Rules 2005"

Role of Patents in the Pharmaceutical Industry - Recent changes in IPR laws impacting pharmaceutical industry, intellectual cooperation in the pharmaceutical industry, some case studies

SECTION – C

Drug & Cosmetic Act with special reference to schedule Y and M.

Clinical trials & Good clinical practices (GCP), guidelines and related management- GCP guidelines, principles of ICH GCP, ethical principles related to GCP, clinical trials, SOPs, regulation: obtaining clinical trial permission, application for permission, report: clinical trial report, trial management: data monitoring committee (DMC).

SECTION – D

Quality control and Quality Assurance: Requirements of GMP, cGMP, GLP, ISO-9000, regulatory requirements of drugs and pharmaceutical (USFD-NDA/ANDA), total quality management (TQM) Concept.

Stability testing of new drug substances and products: Drug substance – criteria, storage conditions, long term testing, accelerated testing, frequency, evaluation, labelling; Drug product – Selection of batches criteria, specification, conditions of storage and testing, Calculation of shelf life and expiry date of products.

Course outcomes:

The course is planned to understand the existing intellectual property rights, schedules, regulations, quality control and stability testing procedures to be followed in the area of pharmaceuticals -

CO1 To offer details of IPR- IPR tool kit, IP protections of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, case studies.

CO2 To understand Exercising and Enforcing IPR- Rights of an IPR owner, licensing agreements, criteria for patent infringement, case studies of patent infringement.

CO3 To make aware of IPR concepts – a contract, unfair competitions and control, some case studies.

CO4 To be versed with GATT, WTO, TRIPs (provisions in TRIPs).

CO5 To study characteristics of Patents- patenting process, patent cooperation treaty, conditions to be satisfied by an invention to be patentable.

CO6 To have knowledge of Patent Laws - The Patents Act 1970, The Patent Rules 2003, The Patent Rules 2005.

CO7 To be aware of role of patents in pharmaceutical industry-Recent changes in IPR laws impacting pharmaceutical industry, intellectual cooperation in the pharmaceutical industry, case studies.

CO8 To be acquainted with Drug & Cosmetic Act (w.r.t. schedule Y & M).

CO9 To learn about Clinical trials & Good clinical practices (GCP)-guidelines, (ethical) principles of ICH GCP, SOPs, clinical trial permission, application for permission, report: clinical trial report, trial management: data monitoring committee (DMC).

CO10 To know about Quality control and Quality Assurance: Requirements of GMP, CGMP, GLP, ISO-9000, regulatory requirements of drugs and pharmaceutical (USFD-NDA/ANDA), total quality management (TQM) Concept.

CO11 To be familiar with stability testing of new drug substances- long term testing, accelerated testing, frequency.

CO12 To have an idea of conditions of storage and calculation of shelf life & expiry date of products.

Mapping of Paper No. CHEM-403

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO2	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO4	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO5	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO6	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO7	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO8	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO9	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO10	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO11	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S
CO12	S	S	S	S	S	S	M	S	S	S	S	M	S	M	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, Tata Mc Graw Hill (2001)
2. Steve Smith, The Quality Revolution, 1st ed., Jaico Publishing House (2002).
3. Lippincott Williams & Wilkins, The Science and Practice of Pharmacy, Vol. I & II, 21st edition, Remington, Wolters Kluwer Health (India) Pvt. Ltd., New Delhi (2005).
4. Arun Bhatt, Clinical Trials and Good Clinical Practice in India, 1st edition, D. K. Publications, Mumbai (2006).

M.Sc. Chemistry Semester IV
Pharmaceutical Chemistry Special-VI (CHEM-404)

Credits-4 **Total Marks = 80**
Time: 3 Hrs. **60 (EM) + 20 (IA)**

Note: Eight questions will be set, two from each of the sections A, B, C & D. The candidates are required to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

SECTION – A

Heat Transfer: Introduction, modes of heat transfer, Fourier's law of heat flow, thermal conductivity, steady state conduction. Equipments: Finned tube (extended surface) heat exchanger, plate heat exchanger, spiral heat exchanger, scraped heat exchanger and air cooled heat exchanger.

Distillation: Introduction, vapour – liquid equilibrium, partial vaporization, partial condensation, volatility, relative volatility, methods of distillation for two component systems–fractional distillation, azeotropic distillation, steam distillation, extractive distillation.

Filtration: Introduction, classification of filters, plate & frame filter presses, candle filter, filter media, filter aids, washing of filter cakes, filtration theory – constant pressure filtration, constant rate filtration, filtration cycle, centrifuges, batch top driven centrifuge, batch under driven centrifuge, disk type centrifuge.

SECTION – B

Drying: Introduction, rate of drying, constant rate period, critical moisture content, falling rate period, equilibrium moisture, free moisture, bound and unbound moisture, drying equipments – tray dryers, drum dryers, rotary dryers, spray dryers, flash dryers.

Crystallization: Introduction, supersaturation, modes of generation of supersaturation, nucleation, primary nucleation, secondary nucleation, crystal growth, Δ L law of cyrstal growth, growth rate and growth coefficients, crystallisation equipments – Tank crystallizers, circulating magma – vacuum crystallizers, circulating liquid evaporator crystallizers.

Fluid Flow: Introduction, Newtonian and non-Newtonian fluids, viscosity, effect of temeprature on viscosity, kinematic viscosity, laminar and turbulent flows, Reynolds number, Bernoullis equation without friction, orificemeter, venturimeter, pumps, types of pumps.

SECTION – C

Reactors: Introduction to reactor design, ideal batch reactor, space time, space velocity, steady state mixed flow reactor, steady state plug flow reactor.

Chemical process development: Process design development, types of design process development, plant location, plant layout, plant operation and control, material handling.

Safety and loss prevention: Health and safety hazards, source of exposure, exposure evaluation, exposure hazard control, fire and explosion hazard, safety regulation, loss prevention.

SECTION – D

Chromatographic techniques: Principles of separation, applications and recent trends in chromatography:

Column, Paper, Thin layer and gas chromatography, HPLC, HPTLC, Size exclusion chromatography, Affinity chromatography, Ion-exchange chromatography.

Biological Standardization: Bioassay and Radioimmunoassay: ELISA, radioimmunoassay of drugs like Digitalis & insulin.

Course outcome:

The present course is designed to impart knowledge about various techniques used in large scale production of pharmaceuticals-

CO1 To discuss modes and Fourier's Law of heat transfer, thermal conductivity, steady state conduction.

CO2 To confer details of heat exchangers- Finned tube, plate, spiral & air cooled.

CO3 To make understand vapour-liquid equilibrium, partial vaporization & condensation, volatility, relative volatility.

CO4 To tell about methods of distillation- fractional, azeotropic, steam, extractive.

CO5 To know about types of filters (plate & frame filter presses, candle filter), filter media, filter aids, washing of filter cakes, filtration theory-constant pressure & constant rate filtration.

CO6 To familiarize with types of centrifuges- batch top-driven, batch under-driven, disk type.

CO7 To understand concepts of drying-rate of drying, constant rate period, critical moisture content, falling rate period, equilibrium moisture, free moisture, bound & unbound moisture.

CO8 To inform about dryers- tray, drum, rotary, spray, flash.

CO9 To apprise of crystallization- supersaturation, modes of generation of supersaturation, nucleation, crystal growth, law of cyrstal growth, growth rate and growth coefficients.

CO10 To be acquainted with crystallizers- Tank, circulating magma-vaccum, circulating liquid evaporator.

CO11 To offer details of fluid flow, viscosity and pumps, Newtonian and non-Newtonian fluids, kinematic viscosity, laminar and turbulent flows, Reynolds number, Bernoullis equation without friction, orificemeter, venturimeter, pumps, types of pumps.

CO12 To study reactor design and various types of reactors-ideal batch reactor, steady state mixed flow reactor, steady state plug flow reactor.

CO13 To present information about chemical process development-Process design development, plant location, plant layout, plant operation and control, material handling.

CO14 To be aware about safety and loss prevention- health and safety hazards, source of exposure, exposure evaluation, exposure hazard control, fire and explosion hazard, safety regulation.

CO15 To know about various chromatographic techniques, their principles of separation and applications- Column, Paper, Thin layer and gas chromatography, HPLC, HPTLC, Size exclusion, affinity, ion-exchange chromatography.

CO16 To offer details of Biological Standardization- ELISA, radioimmunoassay of drugs like Digitalis & insulin.

Mapping of Paper No. CHEM 404

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO8	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO9	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO10	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO11	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO12	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO13	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO14	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO15	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO16	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Cooper and Gunn's Dispensing for Pharmaceutical Students, Ed.S.J. Carter, CBS publishers & Distributors.
2. Cooper and Gunn's, Tutorial Pharmacy.
3. "Theory and Practice of Industrial Pharmacy" L.Lachman, Lea & Fabiger.
4. "A textbook of Pharmaceutical Chemistry" Bentley and Drivers, Oxford Press.
5. ISO Reports.
6. Indian Pharmacopoeia, Govt. of India, Ministry of Health and Family Welfare.
7. British Pharmacopoeia.
8. Indian Patent Act.
9. Sharma P.P., GMP, Vallabh prakashan.
10. "Remington's Pharmaceutical science". A.Osol Mack Publishing company.
11. Introduction to Chemical Engineering, Bedger et al., McGraw Hill.
12. Unit Operations of Chemical Engineering, Mc. Cable & Smith.
13. Handbook of Chemical Engineering by parry.
14. Principles and methods of Pharmacy management, Harrg, A.; smith Loa & Febiger, Philadelphia.
15. Materials management by Gopalkrishna, Prentice Hall, India.
16. Unit Operations of Chemical Reactor Design and Operation. W.d. Mc Cabe. J.C. Smith & P. Harriott.
17. "Chemical Reactor Design and Operation" K.R. Westreterp, W.P. M. Swaaij, AACM, Beanackers.
18. Introduction to chemical Engineering, Mc Graw Hill W.L.Badger and J.T. Benchard,.
19. Max peters, "Elementary chemical Engineering".
20. "Chemical Process Development"-Pt.I. D.G. Joreden,
21. "Plant Design and Economics for chemical Engineers" M.S. Peters & K.D. Timmerhans.

M.Sc. Chemistry Semester IV
Inorganic Chemistry Special Practical III & IV
(CHEM 405 & CHEM 406)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Inorganic Chemistry Special Practical III (CHEM-405)

Quantitative analysis:

Determination of triple elements in the mixtures, ores, alloys etc. by available analytical techniques.

I Volumetrically.
II Gravimetrically.
III Instrumentation methods.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To demonstrate the separation and quantitation of three metal ions present in a given solution.

CO2 To quantify the presence of an analyte a given pharmaceutical sample.

CO3 To know the basic concept of EDTA titrations and its utilization in quantitative analysis.

Mapping of Paper No. CHEM-405

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	S	S	S	M	M	S	S	S	S
CO2	S	S	S	M	S	M	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	M	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Inorganic Chemistry Special Practical IV (CHEM-406)

1. Determination of any one metal ion by volumetric method (Complexometric titration).

   Ca^{2+}, Mg^{2+}, Zn^{2+} , Cu^{2+} etc.

2. Preparation of some inorganic compounds and their spectral studies.

   Tris(acetyl-acetonato) manganese (III)

   Tris(acetyl-acetonato) cobaltate (III)

Preparation of Ferrocene

Tris thioureacopper(I) sulfate

Tris(acetylacetonato)chromium(III)

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To know about the basic concept of titrations and its utilization in the quantitative analysis of metal ions.

CO2 To prepare samples of various metal ligand complexes and also their spectroscopic characterstics.

Mapping of Paper No. CHEM-406

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	W	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	W	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. A Text Book of Quantitative Analysis: A. I. Vogel, ELBS, London.

2. Inorganic Preparations: W. G. Palmer.

Or

M.Sc. Chemistry Semester IV
Physical Chemistry Special Practical III & IV
(CHEM 405 & CHEM 406)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Physical Chemistry Special Practical – III (CHEM 405)

pH-metry

1. Preparation of buffer solution of various pH and the determination of their pH values.
2. pH-titratioins of: (i) Acetic acid vs. NaOH, (ii) hydrochloric acid vs. NaOH, (iii) acetic acid vs. ammonium hydroxide and (iv) HCl vs. NH_4OH.
3. Determination of the degree of hydrolysis of aniline hydrochloride.
4. To find dissociation constants of weak acids.
5. Determine the Hammett constant of a given substituted benzoic acid by pH measurements.

Chemical Kinetics

6. Determination of velocity constant of the reaction of ethyl acetate with NaOH and activation energy and temperature coefficient of the reaction.
7. Determination of the velocity constant and energy of activation of the reactions between H_2O_2 and HI.
8. Investigation of the reaction between acetone and iodine (with respect to H^+, I_2 and acetone).
9. Determination of the order and velocity of the reaction between potassium persulphate and potassium iodide.
10. Study the rate of reaction between ethyl bromoacetate and sodium thiosulphate kinetically.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To apply pH-metry in

- ❖ Determining buffer solutions and determining their pH values.
- ❖ Performing acid-base titrations.
- ❖ Determining degree of hydrolysis and dissociation constants.

CO2 To study the chemical kinetics of reactions between.

- ❖ Ethyl acetate and NaOH, acetone and iodine, potassium persulphate and potassium iodide, ethylbromoacetate and sodium thiosulphate.

CO3 To be able to use Origin-Lab software in drawing graphs of different styles.

CO4 To use excel worksheet in linear curve fitting, calculation of regression coefficient, standard deviation and variance.

CO5 To use excel worksheet to calculate activation energy using thermal analysis data.

CO6 To develop the ability to compile interpreted information in the form of lab record.

CO7 To face viva-voce.

Mapping of Paper No. CHEM-405

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Physical Chemistry Special Practical – IV (CHEM 406)

Polarography

1. To determine dissolved oxygen in aqueous solution of organic solvent.
2. Determination of half wave potentials of some cations in aqueous and in non-aqueous solutions.
3. Determination of half wave potentials of ions in mixtures.
4. Amperometirc titrations involving: (i) $Pb(NO_3)_2$ vs. $K_2Cr_2O_7$ and (ii) $Pb(NO_3)_2$ vs. K_2SO_4.

Interferrometry

5. Determination of speed of sound of pure liquids/mixtures using interferrometer.

Flame Photometry

6. Determination of Na^+, K^+ Ca^{2+} and Mg^{2+} in tap water, juice, electrical etc.

Dielectric Constant and Dipole Moment

7. Determination of dielectric constants of some organic liquids and composition of unknown mixtures.
8. Determination of dipole moments of some organic liquids.

Data-Handling/Representation

1. Using origin-Lab draw data in different styles of graphs.
2. Linear Curve fitting and calculation of regression coefficient using EXCEL worksheet.
3. Calculate activation energy using /thermal analysis data by single/multiple heating rate methods using EXCEL worksheet.

Note: Any experiment may be introduced/deleted in the practical class based on the availability/non-availability of the instruments/chemicals.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO 1 To apply the technique of polarography to :
- ❖ Determine dissolved oxygen in aqueous solution of organic solvent.
- ❖ Determine half-wave potential of cations in solutions and of ions in mixtures.
- ❖ Perform amperometric titrations.

CO 2 To determine speed of sound of liquids using interferometer.

CO 3 To apply flame photometry technique in determining concentration of various ions in liquids.

CO 4 To determine dielectric constants and dipole moments of some organic liquids.

CO 5 To be able to perform GAMESS calculations on molecules.

CO 6 To develop the ability to compile interpreted information in the form of lab record.

CO 7 To face viva-voce.

Mapping of Paper No. CHEM-406

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO8	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO9	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Practical Chemistry, A.M. James and F.E. Pricherd, Longman.
2. Practical Physical Chemistry, B.P. Levitt and Zindley's, Longman.
3. Practical Physical Chemistry, S.R. Palit and S.K. De, Science Book Agency.
4. Experimental Physical Chemistry, R.C. Das and B. Behra, McGraw Hill.
5. Experiments in Physical Chemistry, Shoemaker and Gailand McGraw Hill.
6. Systematic experimental Physical Chemistry, T.K. Chandershekhar & S.K. Rajbhoj
7. Experimental Physical Chemistry, V.D.Athawale and Parul Mathur, New Age International.

Or

M.Sc. Chemistry Semester IV
Organic Chemistry Special Practical III & IV
(CHEM 405 & CHEM 406)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Organic Chemistry Special Practical – III (CHEM 405)

1. Qualitative Analysis: Separation of components of a binary (liquid-liquid, liquid-solid or solid-solid) organic mixture using physical and chemical method. Characterization of these components with the help of chemical analysis and derivative formation.
2. Spectroscopic confirmation of the components of binary mixtures using IR and NMR tools (IR & NMR spectra will be provided).

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To understand the methods of separations of binary (liquid-liquid, liquid-solid or solid-solid) organic mixtures.

CO2 Identification of different functional groups using qualitative analysis.

CO3 To understand significance of melting point and boiling point in structure elucidation of organic compounds.

CO4 To prepare derivatives of different organic functionalities.

CO5 To characterize given organic compounds by interpreting their ^{1}H NMR and FT-IR spectra.

CO6 To perform experimentation and evaluation the results.

CO7 To develop the ability to compile information in the form of lab records.

CO8 To defend Viva-voce examination.

Mapping of Paper No. CHEM-405 Organic Special Practical III

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO6	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO7	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S
CO8	S	S	M	S	S	S	S	S	M	M	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Organic Chemistry Special Practical – IV (CHEM 406)

1. **Colorimetric determination of the following:** Carbohydrates, ascorbic acid, amino acids, proteins, cholesterol, urea.
2. **Extraction of organic compound from natural products:** Any one of the followings:–
   Caffeine from tea leaves.

   Isolation of β-carotene from carrot.

   Isolation of limonene from citrus rind.

   Isolation of nicotine from tobacco.

   Isolation of lactose from milk.

   Isolation of Casein from milk.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To quantitatively estimate carbohydrates, ascorbic acid, amino acids, proteins, cholesterol, urea colorimetrically.

CO2 To purify natural products from raw material.

CO3 To perform experimentation, evaluation, compilation and presentation of results.

CO4 Skill development to explain the results.

Mapping of Paper No. CHEM-406

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	--	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Elementary Practical Organic Chemistry by Arthur I.Vogel Longmans, Green and Co. 1958.
2. An Introduction to Practical Biochemistry, by David T. Plummr, Tata McGraw Hill Publishing Company, Ltd., N. Delhi, 1988.
3. Practical Organic Chemistry' by Mann and Saunders.
4. Text Book of Vogel's Practical Organic Chemistry by Longman Group, B.S. Furness et al., Ltd.
5. Experiments in Organic Chemistry" Louis F. Fieser O.C. Heath and Company Boston, 1955.
6. Organic Synthesis" Collective Vol. I.
7. Laboratory Manual in Organic Chemistry' by R.K. Bansal, Wiley Eastern Ltd., New Delhi-1980.
8. "A Handbook of Organic Analysis Qualitative and Quantitative" by H.T. Clarke and revised by B.Maynes, Edward Arnold (Pub.)., Ltd. London, 1975).
9. "Systematic Qualitative Organic Analysis" by H.Middleton, Edward Arnold (Publishers) Ltd., London 1959.
10. "A Text Book of Practical Organic Chemistry including Qualitative Organic Analysis" by Arthur I. Vogel, Longmans Green and Co., Ltd., London 1966.
11. "Elementary Practical Organic Chemistry" by Arthur I. Vogel, CBS Publishers & Distributors.
12. "A Guide to spectroscopy in Organic Chemistry' by PAVY
13. "Spectrometric Identification of Organic Compounds", Fifth Ed., R.M. Silverstein, G.S. Bassler and T.C.Morrile, John Wiley and Sons, New York.
14. "Organic Spectroscopy', 3rd Ed., by William Kamp. John Wiley & Sons.

15. "Spectroscopic" Methods in Organic Chemistry, D.H. William & Ian Fleming.

16. Vogel's Text Book of Practical Organic Chemistry by B.S. Furners et. al., Longman Group Ltd. "A Handbook of Organic Analysis Qualitative and Quantitative" by H.T. Clarke and revised by B.Maynes, Edward Arnold (Pub.), Ltd. London, 1975).

17. "Systematic Qualitative Organic Analysis" by H.Middleton, Edward Arnold (Publishers) Ltd., London 1959.

Or

M.Sc. Chemistry Semester IV
Pharmaceutical Chemistry Special Practical III & IV
(CHEM 405 & CHEM 406)

Credits-4+4 **Total Marks = 80 (Each)**
Time: 12 Hrs. **Max. Marks: 60(EA)+20(IA) & 60(EA)+20(IA)**
(Four sessions, spread over 2 days to all papers)

Pharmaceutical Chemistry Special Practical III (CHEM 405)

1) Separations and identification of components of binary organic mixture using chemical methods and spectral data.

2) Applications of IR, UV, ^{1}HNMR, ^{13}C NMR, Mass spectroscopy in drug analysis.

3) Chromatographic separations: TLC, paper and column.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 To have practical knowledge of separation of binary mixtures: liquid-liquid, liquid - solid or solid-solid, containing acidic/basic/water-soluble components.

CO2 To identify extra elements by making Lassaigne's extract.

CO3 To perform chemical tests for the identification of functional groups.

CO4 To prepare derivatives of organic functionalities.

CO5 To characterize compounds by spectral techniques.

CO6 To carry out chromatographic separations.

CO7 To perform various experiments and evaluate the results.

CO8 To develop the ability to compile interpreted information in the form of lab record.

CO9 To face viva-voce.

Mapping of Paper No. CHEM 405 (Practical)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO7	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S
CO8	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO9	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Pharmaceutical Chemistry Special Practical IV (CHEM 406)

1) Determination of specific rotation of ibuprofen and determination of its percentage in the unknown sample.
2) Volumetric determination of ibuprofen in the given tablet.
3) Spectrophotometer determination of aspirin content in the soluble aspirin table.
4) Spectrophotometer determination of Paracetamol in the tablet.
5) Determination of Vitamin C in given formulation.
6) Determination of phenobarbilone in the given cough syrup.
7) To perform I.P. monograph of tablet
8) To perform I.P. monograph of hard gelatine capsule.
9) Determination of Chloramphenicol in given capsule.

Experiment **Marks: 40**
Lab record & Viva-voce **Marks: 10+10**

Course outcomes:

CO1 The practicals are designed to study assay of drugs, their volumetric and spectrophotometric analysis.

CO2 To have practical knowledge of friability test of a tablet to know percentage weight loss.

CO3 To carry out disintegration test.

CO4 To perform experiments and evaluate the results.

CO5 To develop the ability to compile interpreted information in the form of lab record.

CO6 To face Viva-voce.

Mapping of Paper No. CHEM-406

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. "A Handbook of Organic Analysis Qualitative and Quantitative" by H.T. Clarke and revised by B.Maynes, Edward Arnold (Pub.), Ltd. London, 1975).
2. "Systematic Qualitative Organic Analysis" by H.Middleton, Edward Arnold (Publishers) Ltd., London 1959.
3. "A Text Book of Practical Organic Chemistry including Qualitative Organic Analysis" by Arthur I. Vogel, Longmans Green and Co., Ltd., London 1966.
4. "Elementary Practical Organic Chemistry" by Arthur I. Vogel, CBS Publishers & Distributors.
5. "A Guide to spectroscopy in Organic Chemistry' by PAVY
6. "Spectrometric Identification of Organic Compounds", Fifth Ed., R.M. Silverstein, G.S. Bassler and T.C.Morrile, John Wiley and Sons, New York.
7. "Organic Spectroscopy', 3rd Ed., by William Kamp. John Wiley & Sons.
8. "Spectroscopic" Methods in Organic Chemistry, D.H. William & Ian Fleming.
9. Vogel's Text Book of Practical Organic Chemistry by B.S. Furners et. al., Longman Group Ltd.

OPEN ELECTIVE PAPERS OFFERED BY CHEMISTRY DEPARTMENT FOR M.Sc. STUDENTS OF DEPARTMENT OF PHYSICAL SCIENCES OTHER THAN CHEMISTRY DEPARTEMENT

M.Sc. Physical Sciences.
Open elective paper-01 (OE-201, 2nd Semester)
Environmental and Analytical Chemistry

Credits-2 **Total Marks = 50**
Time: 2 Hrs. **Max. Marks: 35(EA)+15(IA)**

Note: Eight questions will be set, four from each of the sections. The candidates are required to attempt five questions in all selecting two question from each section. All questions carry equal marks.

SECTION – A

Hydrosphere

Hydrological cycle of water, Water pollution – inorganic, organic, pesticide, agricultural, industrial and sewage, detergents, oil spills and oil pollutants. Water quality parameters – dissolved oxygen, biochemical oxygen demand, solids, metals, content of chloride, sulphate, phosphate, nitrate and micro-organisms. Water quality standards.

Atmosphere

Chemical composition of atmosphere – particles, ions and radicals and their formation, Chemical and photochemical reactions in atmosphere, smog formation, oxides of N, C, S and their effect, air pollution controls and their chemistry.

SECTION – B

Thermoanalytical methods:

Introduction, Thermogravimetric analysis (TGA), Derivative Thermogravimetric analysis (DTGA), factors affecting TGA and applications, Differential thermal analysis (DTA): theory, factors affecting DTA and applications.

Chromatography

Introduction, Classification of chromatographic methods; Adsorption and Partition Chromatography (Column, Paper and Thin Layer Chromatography), ion exchange chromatography: Principles and Applications.

Analysis of Food

Importance of Food analysis, Determination of approximate composition: Moisture, Fat, Protein, Fiber, Carbohydrate etc.

Course outcomes:

CO1 To discuss the hydrological cycle of water, water pollution, water quality parameter and standards.

CO2 To know about chemical composition of atmosphere and chemistry of air pollution and control.

CO3 To study the Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), factors affecting these techniques and their applications.

CO4 To discuss the principle and applications of chromatographic methods.

CO5 To describe the importance of food analysis and their approximate composition.

Mapping of Paper No. CHEM OE-201

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Environmental Chemistry; A. K. De, Wiley Eastern.
2. Environmental Pollution Analysis; S. M. Khopkar, Wiley Eastern.
3. Environmental Chemistry; S. K. Banerji: Prentic– Hall.
4. Handbook of Thermal Analysis and Calorimetry; M. E. Brown.
5. Dynamics of Chromatography Part I; J. C. Gidding; Dekker, New York.
6. Instrumental methods of Analysis; L. L. Merits, R. H. Willard and J. A. Dean; Van Nostrand-Reinhold.

M.Sc. Chemistry
Open elective paper-02 (OE-301, 3rd Semester)
Applied Chemistry

Credits-2 **Total Marks = 50**
Time: 2 Hrs. **Max. Marks: 35(EA)+15(IA)**

Note: Eight questions will be set, four from each of the sections. The candidates are required to attempt five questions in all selecting two question from each section. All questions carry equal marks.

SECTION A

Polymer Chemistry

Polymer basic concepts: monomers, degree of polymerization, classification of polymers, types of polymerization, Concept of no. average molecular weight and mass average molecular weight, Methods of determining molecular weights, concept of kinetic chain length Polydispersity index, kinetics of polymerization (addition and chain polymerization) Thermal properties of polymers, Flame retardant polymers, Flame retarding Thermoplastics and Thermosets, physical properties of polymers (glass transition temperature, crystalline melting point), factors affecting T_g and T_m Polymer composites, its classification, polymer composites using filler reinforcement, Biocomposites, application of biocomposites in automobiles and in construction materials. Polymer nanocomposites, Properties of polymer nanocomposites, application of polymer nanocomposites

SECTION B

Medicinal Chemistry

Concept of drug and drug development, lead compound and lead modification, prodrugs and soft drugs, an elementary idea of structure reactivity relationship (SAR), Elementary idea about drug action: the receptor role, neurotransmitters and receptors, ion channels and their control, membrane bound enzymes-activation/deactivation, chemical basis of messenger induced change of shape by the receptor.

Definition, uses and side effects of the following categories of drugs:

Antipyretics, analgesics & anti-inflammatory agents (paracetamol, asprin, mefenamic acid, ibuprofen and diclofenac), antimalarial (Chloroquine, chloroguanide), Anticancer (Chlorambucil, cyclophosphamide), Cardiovascular drugs (sorbitrate, diltiazem), Antifertility agents (introduction to hormonal and nonhormonal contraception only).

Mapping of Paper No. OE-301

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	W	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO6	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO7	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S
CO8	S	S	S	S	M	S	S	S	S	S	M	S	S	S	S

S = Strong, M = Medium, W = Weak

Books Suggested:

1. Polymer Chemistry, Billmayer
2. Polymer Chemistry, Gowarikar
3. Principles of Polymerization, Geroge Odian
4. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Ed. Robert F. Dorge.
5. Burger's Medicinal Chemistry and Drug Discovery, Vol-I, Ed. M.E. Wolf, John Wiley.
6. Goodman and Gilman's Pharmacological Basis of Therapeutics, McGraw-Hill.

Learning Outcomes-based Curriculum Framework
for
B.Sc. –with PHYSICS

(w. e. f. the Academic Session 2020-21 in phased manner)

KURUKSHETRA UNIVERSITY, KURUKSHETRA

KURUKSHETRA UNIVERSITY, KURUKSHETRA

REVISED SCHEME OF EXAMINATION FOR

B.Sc. - I (PHYSICS)

(1st& 2nd SEMESTER) EXAMINATIONS

Under Choice Based Credit System(CBCS)

W.E.F. SESSION 2020-21

SCHEME OF EXAMINATIONS

SEMESTER-I

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. Hours
					External	Internal	Total	
B-PHY-101	CC*-1	Mechanics-I	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-102	CC-2	Mechanics-II	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-103	CC-3	Physics Practical-I	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

*CC-Core Course

SEMESTER-II

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-201	CC-4	Electricity, Magnetism & E.M.Theory	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-202	CC-5	Electronics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-203	CC-6	Physics Practical-II	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

KURUKSHETRA UNIVERSITY, KURUKSHETRA

REVISED SCHEME OF EXAMINATION FOR

B.Sc. -II (PHYSICS)

(3rd&4thSEMESTER) EXAMINATIONS

Under Choice Based Credit System (CBCS)

W.E.F. SESSION 2021-22

SCHEME OF EXAMINATIONS

SEMESTER-III

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-301	CC*-7	Thermal Physics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-302	CC-8	Statistical Mechanics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-303	CC-9	Physics Practical-III	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

*CC-Core Course

SEMESTER-IV

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-S1	Skill Enhancement Course in Physics (SECP-1)	(A) Applied Optics/ (B) Renewable Energy & Energy Harvesting	**02**	**02**	**40**	**10**	**50**	**3**
B-PHY-401	CC-10	Wave & Optics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-402	CC-11	Quantum Mechanics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-403	CC-12	Physics Practical-IV	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**250**	

KURUKSHETRA UNIVERSITY, KURUKSHETRA

REVISED SCHEME OF EXAMINATION FOR

B.Sc. -III(PHYSICS)

(5th&6thSEMESTER) EXAMINATIONS

Under Choice Based Credit System (CBCS)

W.E.F. SESSION 2022-23

SCHEME OF EXAMINATIONS

SEMESTER-V

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-501	DSE*-1	(I) Nuclear Physics (II) Mathematical Physics	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-502	DSE-2	(I) Solid State Physics (II) Medical Physics	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-503	DSE-3	(I) / (II) Physics Practical-V	**02**	**04**	**40**	**10**	**50**	**3**
				Total Marks			**200**	

*DSE-Discipline Specific Elective

SEMESTER-VI

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-601	DSE-4	(I) Atomic & Molecular Spectroscopy (II) Elements of Modern Physics	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-602	DSE-5	(I) Digital Analogy & Instrumentation (II) Embedded System	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-603	DSE-6	(I) / (II) Physics Practical-VI	**02**	**04**	**40**	**10**	**50**	**3**
				Total Marks			**200**	

Program Outcomes (PO) for Under Graduate Programme (1st to 6th semesters of B.Sc. with Physics), Institute of Integrated & Honors Studies, KUK:

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems
PO4	Individual and Team Work	Capable to learn and work effectively as an individual , and as a member or leader in diverse teams, multidisciplinary settings
PO5	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO6	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO7	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO8	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
PO9	Environment and Sustainability	Ability to design and develop modern systems which are environmentally sensitive and to understand the importance of sustainable development
PO10	Ethics	Apply ethical principles and professional responsibilities in scientific practices
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

Programme specific outcomes

After successful completion programme, the students will be able to:

PSO1: Acquire an in-depth understanding and knowledge of the basic concepts of physics and be able to appreciate how diverse phenomena observed in nature follow from a small set of fundamental laws through logical reasoning.

PSO2: Be capable of understanding the core physical laws to understand the basic concepts, latest progress and applications of certain sub fields such as nuclear physics, spectroscopy of atoms & molecules, solid state physics, computational physics & electronics.

PSO3: Gain hands-on skills for carrying out basic experiments as well as experiments related to different fields of Physics and attain abilities of critical thinking, problem mapping & solving using fundamental principles of Physics, systematic analysis & interpretation of results.

PSO4: Have a new perspective to look at everything from 'Scientific' point of view that enabling them to pursue higher studies at postgraduate & research level

PSO5: Have awareness of the impact of Physics in social, economical and environmental issues.

Mapping of CO with PO's and PSO's

Course code B-PHY-101																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-101.1	3	3	3	2	2	2	2	3	2	-	2	3	3	3	3	2
B-PHY-101.2	3	3	3	2	3	2	2	3	2	-	2	3	3	3	3	2
B-PHY-101.3	3	3	3	2	3	2	2	3	2	-	2	3	3	3	3	1
B-PHY-101.4	3	3	2	2	2	1	2	2	1	-	2	3	3	3	3	1
Average	3	3	2.75	2	2.5	1.75	2	2.75	1.75	-	2	3	3	3	3	1.5
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-102																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-102.1	3	3	3	2	2	2	2	3	2	-	2	3	3	2	2	2

B-PHY-102.2	3	3	3	3	3	2	2	2	2	-	2	3	3	2	3	2
B-PHY-102.3	3	3	2	2	2	2	2	2	2	-	2	3	3	2	3	2
B-PHY-102.4	3	3	2	2	2	2	2	3	2	-	1	3	3	2	2	2
Average	3	3	2.5	2.25	2.25	2	2	2.5	2	-	1.75	3	3	2	2.5	2

Course code:B-PHY-103																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-103.1	3	3	3	3	2	2	2	3	2	-	2	3	3	3	3	3
B-PHY-103.2	3	3	3	3	2	3	2	3	2	-	2	3	3	2	3	3
B-PHY-103.3	3	3	3	3	2	3	2	2	2	-	2	3	3	3	3	3
B-PHY-103.4	3	3	3	3	3	3	2	3	2	-	3	3	3	3	3	3
Average	3	3	3	3	2.75	2.75	2	2.75	2	-	2.75	3	3	2.75	3	3

Semester-II

Course code B-PHY-201																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-201.1	3	3	3	2	2	2	3	2	2	-	3	3	3	2	3	2
B-PHY-201.2	3	3	3	2	2	2	2	3	2	-	2	3	3	2	3	2
B-PHY-201.3	3	3	3	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-201.4	3	3	3	2	2	2	3	2	2	-	3	3	2	2	2	2
Average	3	3	3	2	2	2	2.5	2.75	2	-	2.5	3	2.5	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-202

COs	PO1- Knowledge	PO2- Communication	PO3- Problem Solving	PO4- Individual and Team Work	PO5- Investigation of Problems	PO6- Modern Tool usage	PO7- Science and Society	PO8- Life-Long Learning	PO9- Environment and Sustainability	PO10- Ethics	PO11- Project Management	PSO1	PSO2	PSO3	PSO4	PSO5
B-PHY-202.1	3	3	3	3	3	2	2	3	2	-	2	3	3	2	3	2
B-PHY-202.2	3	3	3	3	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-202.3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-202.4	3	3	2	2	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2.25	2	2.5	2

Course code:B-PHY-203																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-203.1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-203.2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-203.3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-203.4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2

Mapping of CO with PO's and PSO's

Semester-III

Course code B-PHY-301																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-301.1	3	3	2	2	2	2	2	3	2	-	2	3	2	2	3	2
B-PHY-301.2	3	3	2	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-301.3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-301.4	3	3	2	2	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2	2	2	2	2	2.5	2	-	2	2.5	2	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-302																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-302.1	3	3	3	3	3	1	2	2	2	-	2	3	2	2	3	2
B-PHY-302.2	3	3	3	3	2	1	2	2	2	-	2	3	2	2	3	2
B-PHY-302.3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-302.4	3	3	2	2	2	1	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	1.25	2	2	2	-	2	2.5	2	2	2.5	2

Course code:B-PHY-303																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-303.1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-303.2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-303.3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-303.4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2

Mapping of CO with PO's and PSO's

Semester-IV

Course code B-PHY-401																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-401.1	3	3	2	3	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-401.2	3	3	2	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-401.3	3	3	2	2	2	2	2	2	2	-	2	2	2	2	2	2
B-PHY-401.4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	2	2
Average	3	3	2.25	2.5	2	2	2	2	2	-	2	2.5	2	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-402																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-402.1	3	3	2	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-402.2	3	3	2	2	2	2	2	2	2	-	2	3	3	2	3	2
B-PHY-402.3	3	3	3	2	2	2	2	2	2	-	2	3	3	2	2	2
B-PHY-402.4	3	3	3	3	2	2	2	2	2	-	2	3	3	2	2	2
Average	3	3	2.5	2.25	2	2	2	2	2	-	2	3	2.75	2	2.25	2

Course code:B-PHY-403																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-403.1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-403.2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-403.3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-403.4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2

Course code:B-PHY-S1(A)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-S1.1	2	2	2	3	2	2	2	2	2	-	2	2	2	2	2	2
B-PHY-S1.2	3	3	2	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-S1.3	3	3	3	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-S1.4	2	2	2	3	2	2	2	2	2	-	2	2	2	2	2	2
Average	2.5	2.5	2.25	2.5	2	2	2	2	2	-	2	2.5	2	2	2.25	2

Course code:B-PHY-S1(B)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-S1.1	2	2	2	3	2	2	2	2	3	-	2	2	2	2	2	2
B-PHY-S1.2	3	2	2	2	2	2	2	2	3	-	2	3	2	2	2	2
B-PHY-S1.3	2	2	2	2	2	2	2	2	2	-	2	2	2	2	2	2
B-PHY-S1.4	2	2	2	3	2	2	2	2	2	-	2	2	2	2	2	2
Average	2.25	2	2	2.5	2	2	2	2	2.5	-	2	2	2	2	2	2

Mapping of CO with PO's and PSO's
Semester-V

Course code B-PHY-501(I)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-501(I).1	3	3	3	2	2	2	2	3	2	-	2	3	2	2	2	2
B-PHY-501(I).2	3	3	2	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-501(I).3	3	3	2	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-501(I).4	3	3	3	2	2	2	2	3	2	-	2	3	3	2	3	2
Average	3	3	2.5	2	2	2	2	2.5	2	-	2	3	2.75	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-501(II)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-501(II).1	3	3	3	2	2	2	2	3	2	-	2	3	3	2	2	2
B-PHY-501(II).2	3	3	3	2	2	2	2	2	2	-	2	3	3	2	2	2
B-PHY-501(II).3	3	3	3	2	2	2	2	2	2	-	2	3	3	2	3	2
B-PHY-501(II).4	3	3	3	2	2	2	2	3	2	-	2	3	3	2	3	2
Average	3	3	3	2	2	2	2	2.5	2	-	2	3	3	2	2.5	2

Course code B-PHY-502(I)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-502(I).1	3	3	2	2	2	2	2	2	2	-	2	3	3	2	2	2
B-PHY-502(I).2	3	3	2	2	2	2	2	2	2	-	2	3	3	2	2	2
B-PHY-502(I).3	3	3	2	2	2	2	2	2	2	-	2	3	3	2	3	2
B-PHY-502(I).4	3	3	2	2	2	2	2	2	2	-	2	3	3	2	3	2
Average	3	3	2	2	2	2	2	2	2	-	2	3	3	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-502(II)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-502(II).1	3	3	2	2	2	2	2	3	2	-	2	3	2	2	2	2
B-PHY-502(II).2	3	3	2	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-502(II).3	3	3	2	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-502(II).4	3	3	2	2	2	2	2	3	2	-	2	3	2	2	3	2
Average	3	3	2	2	2	2	2	2.5	2	-	2	3	2	2	2.5	2

Course code B-PHY-503(I)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-503(I).1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-503(I).2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-503(I).3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-503(I).4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-503(II)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-503(II).1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-503(II).2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-503(II).3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-503(II).4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2

Mapping of CO with PO's and PSO's
Semester-VI

Course code B-PHY-601(I)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-601(I).1	3	3	2	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-601(I).2	3	3	3	3	2	2	2	3	2	-	2	3	3	2	3	2
B-PHY-601(I).3	3	3	3	3	2	2	2	3	2	-	2	3	3	3	3	2
B-PHY-601(I).4	3	3	2	2	2	2	2	2	2	-	2	3	2	2	2	2
Average	3	3	2.5	2.5	2	2	2	2.5	2	-	2	3	2.5	2.25	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-601(II)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-601(II).1	3	3	2	2	2	2	2	2	2	-	2	3	3	2	2	2
B-PHY-601(II).2	3	3	2	2	2	2	2	2	2	-	2	3	3	2	2	2
B-PHY-601(II).3	3	3	3	3	2	2	2	3	2	-	2	3	3	2	3	2
B-PHY-601(II).4	3	3	3	3	2	2	2	3	2	-	2	3	3	2	3	2
Average	3	3	2.5	2.5	2	2	2	2.5	2	-	2	3	3	2	2.5	2

Course code B-PHY-602(I)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-602(I).1	3	3	3	3	2	2	2	3	2	-	2	3	3	3	3	2
B-PHY-602(I).2	3	3	3	3	2	2	2	3	2	-	2	3	3	3	3	2
B-PHY-602(I).3	3	3	3	3	2	2	2	3	2	-	2	3	3	3	2	2
B-PHY-602(I).4	3	3	3	2	2	2	2	2	2	-	2	3	3	2	2	2
Average	3	3	3	2.75	2	2	2	2.75	2	-	2	3	3	2.75	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-602(II)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-602(II).1	3	3	2	2	2	2	2	2	2	-	2	3	2	2	2	2
B-PHY-602(II).2	3	3	2	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-602(II).3	3	3	2	2	2	2	2	2	2	-	2	3	2	3	3	2
B-PHY-602(II).4	3	3	2	2	2	2	2	2	2	-	2	3	2	3	3	2
Average	3	3	2	2	2	2	2	2	2	-	2	3	2	2.5	2.75	2

Course code B-PHY-603(I)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-603(I).1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-603(I).2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-603(I).3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-603(I).4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Course code: B-PHY-603(II)																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-603(II).1	3	3	2	3	3	2	2	3	2	-	2	3	2	2	3	2
B-PHY-603(II).2	3	3	3	2	2	2	2	2	2	-	2	3	2	2	3	2
B-PHY-603(II).3	3	3	2	2	2	2	2	3	2	-	2	2	2	2	2	2
B-PHY-603(II).4	3	3	3	3	2	2	2	2	2	-	2	2	2	2	3	2
Average	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2

Mapping of Courses with PO's and PSO's for core and elective courses																
COs	**PO1- Knowledge**	**PO2- Communication**	**PO3- Problem Solving**	**PO4- Individual and Team Work**	**PO5- Investigation of Problems**	**PO6- Modern Tool usage**	**PO7- Science and Society**	**PO8- Life-Long Learning**	**PO9- Environment and Sustainability**	**PO10- Ethics**	**PO11- Project Management**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
B-PHY-101	3	3	2.75	2	2.5	1.75	2	2.75	1.75	-	2	3	3	3	3	1.5
B-PHY-102	3	3	2.5	2.25	2.25	2	2	2.5	2	-	1.75	3	3	2	2.5	2
B-PHY-103	3	3	3	3	2.75	2.75	2	2.75	2	-	2.75	3	3	2.75	3	3
B-PHY-201	3	3	3	2	2	2	2.5	2.75	2	-	2.5	3	2.5	2	2.5	2
B-PHY-202	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2.25	2	2.5	2
B-PHY-203	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-301	3	3	2	2	2	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-302	3	3	2.5	2.5	2.75	1.25	2	2	2	-	2	2.5	2	2	2.5	2
B-PHY-303	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-401	3	3	2.25	2.5	2	2	2	2	2	-	2	2.5	2	2	2.5	2
B-PHY-402	3	3	2.5	2.25	2	2	2	2	2	-	2	3	2.75	2	2.25	2
B-PHY-403	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-S1(A)	2.5	2.5	2.25	2.5	2	2	2	2	2	-	2	2.5	2	2	2.25	2
B-PHY-S1(B)	2.25	2	2	2.5	2	2	2	2	2.5	-	2	2	2	2	2	2
B-PHY-501(I)	3	3	2.5	2	2	2	2	2.5	2	-	2	3	2.75	2	2.5	2
B-PHY-501(II)	3	3	3	2	2	2	2	2.5	2	-	2	3	3	2	2.5	2
B-PHY-502(I)	3	3	2	2	2	2	2	2	2	-	2	3	3	2	2.5	2
B-PHY-502(II)	3	3	2	2	2	2	2	2.5	2	-	2	3	2	2	2.5	2
B-PHY-503(I)	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-503(II)	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-601(I)	3	3	2.5	2.5	2	2	2	2.5	2	-	2	3	2.5	2.25	2.5	2
B-PHY-601(II)	3	3	2.5	2.5	2	2	2	2.5	2	-	2	3	3	2	2.5	2
B-PHY-602(I)	3	3	3	2.75	2	2	2	2.75	2	-	2	3	3	2.75	2.5	2
B-PHY-602(II)	3	3	2	2	2	2	2	2	2	-	2	3	2	2.5	2.75	2
B-PHY-603(I)	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
B-PHY-603(II)	3	3	2.5	2.5	2.75	2	2	2.5	2	-	2	2.5	2	2	2.5	2
Note: 3-Strong, 2-Medium, 1-Weak																

Learning Outcomes-based Curriculum Framework
for
B.Sc. –with PHYSICS

REVISED SYLLABI&SCHEME OF EXAMINATION

(w. e. f. the Academic Session 2020-21 in phased manner)

KURUKSHETRA UNIVERSITY, KURUKSHETRA

KURUKSHETRA UNIVERSITY, KURUKSHETRA

REVISED SYLLABI&SCHEME OF EXAMINATION FOR

B.Sc. - I (PHYSICS)

(1st& 2ndSEMESTER) EXAMINATIONS

Under Choice Based Credit System

W.E.F. SESSION 2020-21

SEMESTER-I

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. Hours
					External	Internal	Total	
B-PHY-101	CC*-1	Mechanics-I	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-102	CC-2	Mechanics-II	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-103	CC-3	Physics Practical-I	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

*CC-Core Course

SEMESTER-II

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-201	CC-4	Electricity, Magnetism & E.M.Theory	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-202	CC-5	Electronics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-203	CC-6	Physics Practical-II	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

B.Sc-1st year (Semester-I)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-101)
Nomenclature: Mechanics-I
No. of credits: 3

External Marks: 60
Internal Marks: 15

Time: 3 Hours

Note:-

1. Nine questions will be set in total.
2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.
3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

UNIT-I

ROTATIONAL MOTION

Rotation of rigid body, Moment of inertia, Torque, Angular momentum, Kinetic Energy of rotation. Theorem of perpendicular and Parallel axis (with proof), Moment of inertia of Ring, Disc, Rectangular lamina, Solid bar of rectangular cross section, Solid sphere, Hollow sphere, Spherical shell, Solid Cylinder and Hollow cylinder. Fly wheel, Moment of inertia of an irregular body, Acceleration of a body rolling down on an inclined plane.

(15 Lectures)

UNIT-II

ELASTICITY

Elasticity, Stress and Strain, Hooks law, Elastic constant and their relations, Poisson's ratio, Torsion of cylinder and twisting couple, determination of coefficient of modulus of rigidity for the material of wire by Maxwell's Needle, bending of beam (Bending moment and its magnitude), Cantilever and Centrally loaded beam, Determination of Young's modulus for the material of the beam and Elastic constants for the material of the wire by Searle's method.

(15 Lectures)

UNIT-III

OSCILLATIONS

Review of SHM, Simple Harmonic Oscillations, Differential Equation of SHM and its solution. Kinetic Energy, Potential Energy and their space average, time average, total energy. Damped oscillations, forced oscillations, transient and steady state, sharpness of resonance, power dissipation and quality factor. **(15 Lectures)**

UNIT-IV

SURFACE TENSION

Surface Tension: Synclasticand anticlastic surface, excess pressure application to spherical drop and bubbles. Variation of Surface tension with temperature.

VISCOSITY

Kinematics of moving fluids: idea of compressible and incompressible fluids, equation of continuity, steamline and turbulent flow, Reynolds's number, Euler's equation, The special case of fluid statics $F = \Delta p$, Simple applications e.g. Pascal's law and Archimedes principle. Poiseuille's equation for flow of a viscous liquid through a capillary tube.

(15 Lectures)

CO No. **Course code (B-PHY-101): Mechanics-I**

After successfully completing the course, student will be able to:

CO-1 Understand the application of both translational and rotational dynamics motions simultaneously in analyzing rolling with slipping. Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.

CO-2 Understand the principles and basic terms related to elasticity through the study of Young Modulus and modulus of rigidity.

CO-3 Explain the phenomena of simple harmonic motion and the properties of systems executing such motions.

CO-4 Appreciate the concepts and Applications of surface tension and also be able to understand simple principles of fluid flow and different equations governing fluid dynamics.

REFERENCES

1. Mechanics "Berkeley Physics Course Vol. I", Charles Kittel, Tata McGraw-Hill
2. Elements of Properties of Matter, D.S. Mathur, S .Chand & Com. Pt. Ltd., New Delhi
3. Heat and Thermodynamics (5^{th} Edition), Mark W. Zermansky
4. Physics, Resnick, Halliday & Walker, Wiley
5. Properties of Matter, R. Murgeshan, S. Chand & Com. Pt. Ltd., New Delhi

B.Sc-1st year (Semester-I)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-102)
Nomenclature: Mechanics-II
No. of credits: 3

External Marks: 60
Internal Marks: 15

Time: 3 Hours

Note:-

1. Nine questions will be set in total.
2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.
3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

UNIT-I

BASICCONCEPTSOFCLASSICALMECHANICS

Mechanics ofsingleandsystemof particles, Conversion law of linear momentum, Angular momentumandmechanical energy for aparticle anda system ofparticles, Centre ofMass andequation of motion.

(15 Lectures)

UNIT-II

GENERALIZED NOTATIONS

Degrees of freedom andGeneralized coordinates,Transformation equations, Generalized Displacement, Velocity,Acceleration, Momentum, ForceandPotential, Hamilton's variational principle,Lagrange'sequation of motion from Hamilton's principle,Linear Harmonic oscillator, Simple pendulum, Atwood'smachine.

(15 Lectures)

UNIT-III

THEORY OF RELATIVITY-I

Frame of reference, limitation of Newton's law of motion,Inertial frame of reference, Galilean transformation,Frame of reference with linear acceleration, Classical relativity, Galilean invariance, Transformationequation foraframe ofreference- inclined to aninertial

frameand Rotatingframe ofreference, Non-inertial frames; Theaccelerated frame of referenceand rotatingframe ofreference, Fundamental frame of reference, Michelson Morley'sexperiment.

(15 Lectures)

UNIT-IV

THEORY OF RELATIVITY-II

Special theoryofrelativity,Lorentzco-ordinate andphysical significance of Lorentz invariance,Length Contraction, Time Dilation, Twin Paradox, Velocityaddition theorem, Variation of masswith velocity, Massenergyequivalence, Transformationof relativistic momentumand energy, relation between relativistic momentum and energy, Mass, velocity, momentumand energyof zero restmass.

(15 Lectures)

CO No.	**Course code (B-PHY-102): Mechanics-II**
	After successfully completing the course, student will be able to:
CO-1	Learn the concept of conservation of energy, momentum, angular momentum and apply them to understand the basic problems in physics.
CO-2	Understand and explain the Hamilton's variational principle, derive Lagrange's equation of motion from Hamilton's principle and be able to apply these principles to derive the Lagrangian and Hamiltonian for various simple mechanical systems such as Linear Harmonic oscillator, Simple pendulum, Atwood's machine.
CO-3	Differentiate between inertial and Non-inertial frame of references and Describe how fictitious forces arise in a non-inertial frame. Understand the importance of Michelson Morley'sexperiment in referenceto special theory of relativity.
CO-4	Describe special relativistic effects and their effects on the mass and energy of a moving object and appreciate the nuances and important outcomes of Special Theory of Relativity.

REFERENCES

1. Classical Mechanics byH. Goldstein (2^{nd}Edition)
2. BerkeleyPhysics Course.Vol. 1.Mechanics, E.M. Purcell
3. Conceptsof Modern Physics,Arthur Beiser
4. Mechanics,D.S. Mathur, S.Chand& Com. Pt. Ltd., New Delhi
5. BerkeleyPhysics Course.Vol. 1.Mechanics, Charles kittel, Walter D Knight, Malvin A Ruderman, Carel A Helmholz and Burton J Moyer, McGraw-Hill, New York

B.Sc-1st year (Semester-I)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-103)
Nomenclature: Physics Practical-I
No. of credits: 2

External Marks: 40
Internal Marks: 10

Time: 3 HoursMax.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving **Internal marks** (under Lab. Record), each college will maintain practical assessment record by using the following procedure:-
   (i) Each student has to perform a minimum number of experiments prescribed in the syllabus.
   (ii) After the completion of a practical, the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note-book. These marks will constitute the Lab. Record.
   (iii) To complete the final marks for Lab. Record a separate register for each class of B.Sc. will be maintained. The student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average, the total marks obtained will be divided by the total number of required practicals, instead of the number of practicals performed by the student. This record will be signed by the concerned teacher.
   (iv) The Lab. record register will be presented to the external practical examiners for lab. record marks. The external examiners will verify the record randomly.
5. The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1. Measurement of Length (or diameter) using Vernier calliper, Screw Gauge & Travelling Microscope.
2. Moment of Inertia of a Fly Wheel
3. Moment of Inertia of irregular body using a Torsion Pendulum.
4. Surface Tension by Jaeger's Method.
5. Young Modulus by Bending of Beam.
6. Modulus of rigidity of material of wire by Maxwell's Needle.
7. Elastic constant by Searle's method.

8. Viscosity of water by its flow through a uniform capillary tube.
9. Acceleration due to Gravity 'g' by Bar pendulum.
10. To study the Motion of spring and calculate Spring constant & value of Acceleration due to Gravity.
11. To compare Moment of Inertia of a solid Sphere, Hollow Sphere and solid Disc of same mass with the help of Torsion Pendulum.

CO No.	Course code (B-PHY-103) : Physics Practical-I
	After successfully completing the course, student will be able to:
CO-1	Hands on experience with different instruments and appreciate the beauty of different concepts and related experiments in Physics.
CO-2	Verify some fundamental principles, effects and concepts of physics through Experiments.
CO-3	perform experiments related to mechanics (compound pendulum), rotational dynamics (Flywheel), elastic properties (Young Modulus and Modulus of Rigidity) and fluid dynamics (verification of Stokes law, Searle method) etc.
CO-4	Learn to present observations, results and analysis in suitable and presentable form.

REFERENCES

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
4. Practical Physics, S.L. Gupta and V. Kumar, PragatiPrakashan Meerut
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
6. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House

Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-201)
Nomenclature: Electricity, Magnetism & Electromagnetic Theory
No. of credits: 3

External Marks: 60
Internal Marks: 15

Time: 3 Hours

Note:-

1. Nine questions will be set in total.
2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.
3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

UNIT-I

VECTORBACKGROUNDANDELECTRICFIELD

Gradient ofa scalar anditsphysical significance, Line, Surface and Volume integrals of a vectorand their physical significance,Fluxof avector field, Divergenceand curl ofa vector and their physicalsignificance,Gauss's divergence theorem, Stoke's theorem. Derivation of electricfield $\vec{E}$ from potential asgradient.Derivation ofLaplaceand Poisson equations, Electric flux, Gauss'sLaw, Mechanical force of chargedsurface, Energyperunitvolume.

(15 Lectures)

UNIT-II

MAGNETISM

Magnetic induction, Magneticflux, Solenoidal natureof vector field of induction, propertiesof $\vec{B}$ (i) $\nabla . \vec{B} = 0$ (ii) $\nabla \times \vec{B} = \mu_o J$, Electronictheoryofdiaandparamagnetism, Domaintheoryofferromagnetism(Langevin'stheory),CycleofMagnetization-Hysteresis loop(Energydissipation, Hysteresisloss and importance of Hysteresis Curve).

(15 Lectures)

UNIT-III

ELECTROMAGNETISM

Maxwellequations and their derivations, Displacement current, Vector and Scalar potentials,Boundaryconditionsatinterfacebetweentwodifferentmedia, Propagation of electromagneticwave(Basicidea,noderivation), PoyntingvectorandPoynting theorem.

(15 Lectures)

UNIT-IV

A.C. ANALYSIS

A.C. circuitanalysis using complexvariablewith(a)Capacitance and Resistance (CR) (b) ResistanceandInductance (LR)(c)Capacitanceand Inductance (LC) and (d) Capacitance,Inductanceand Resistance(LCR), Series and parallel resonancecircuit, Qualityfactor (sharpness of resonance).

(15 Lectures)

CO No. **Course code (B-PHY-201): Electricity, Magnetism & Electromagnetic Theory**

After successfully completing the course, student will be able to:

CO-1 Explain and differentiate the vector and scalar formalisms of electrostatics. Also be able to Apply Gauss's law of electrostatics to solve a variety of problems.

CO-2 Describe the important properties of magnetic field. Understand the properties and theories of dia-, para- & ferromagnetic materials.

CO-3 Derive Maxwell equations and understand the role of displacement current, scalar and vector potentials and boundary conditions at the interface between different media. The students will also be able to have basic idea about the propagation of electromagnetic waves.

CO-4 Analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.

REFERENCES

1. Electricity and Magnetism, Reitzand Milford (PrenticeHallofIndia)
2. Electricity and Magnetism,A.S. Mahajanand A.A. Rangwala(Tata McGrawHill)
3. Electricity and Magnetism, Edward M Purcell, 1986, McGraw-Hill Education
4. Electricity and Magnetism, J.H. Fewkes& J. Yarwood, Vol. I, 1991, Oxford University Press.
5. Introduction to Electrodynamics, D.J. Griffiths, 3rdEdn 1998 Benjamin Cummings.
6. Electricity and Magnetism, R. Murugeshan, S.Chand& Com. Pt. Ltd., New Delhi
7. Electromagnetic Fields and waves, K.D. Prasad, SatyaPrakashan, New Delhi

(Course Type: Core Course, Course Code: B-PHY-202)
Nomenclature: ELECTRONICS
No. of credits: 3

External Marks: 60
Internal Marks: 15

Time: 3 Hours

Note:-

1. Nine questions will be set in total.
2. Question no. 1 will be compulsory and based on the conceptual aspects of the entire syllabus. This question may have 4 parts and the answer should be in brief but not in Yes/No.
3. Four more questions are to be attempted, selecting one question out of two questions set from each unit. Each question may contain two or more parts. All questions will carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

UNIT-I

BASIC ELECTRONICS

Ideal current source, Ideal voltage source, Current and voltage divider law, Millman's theorem, Thevenin's theorem, Norton's theorem and numericals based on these theorems. Maximum power transfer theorem (with both DC and AC sources), Delta-Star theorem, Nodal Analysis, Maxwell Loop method.

(15 Lectures)

UNIT-II

SEMICONDUCTORS

Energybandsinsolids,Intrinsicandextrinsicsemiconductors, carriermobilityand electricalresistivityofsemiconductors, Halleffect,p-njunctiondiodeandtheir characteristics,ZenerandAvalanchebreakdown, Zenerdiode,Zenerdiodeasavoltage regulator.Lightemittingdiodes(LED), Photoconductioninsemiconductors,Photodiode, SolarCell, *p-n*junctionasa rectifier,halfwaveandfullwaverectifiers(with derivation),filters(seriesinductor,shuntcapacitance,L-sectionorchoke,πandR.C. filter circuits).

(15 Lectures)

UNIT-III

TRANSISTORS

Junction transistors,WorkingofNPNand PNP transistors, Three configurations of transistor (C-B, C-E, C-C modes),Common base, common emitter and common collector characteristics of transistor,Constants of a transistor and theirrelation, Advantages anddisadvantages of C-E configuration. D.C. load line.Transistor biasing;various methods of transistor biasing and stabilization.

(15 Lectures)

UNIT-IV

TRANSISTOR AMPLIFIERS

Amplifiers, Classificationof amplifiers, commonbase and commonemitter amplifiers, couplingofamplifiers, various methodsof coupling, Resistance- Capacitance(RC) coupled amplifier (two stage, concept of band width, no derivation), Feedback in amplifiers, advantages ofnegative feedback, emitter follower, distortion inamplifiers.

(15 Lectures)

CO No.	**Course code (B-PHY-202) : Electronics**

After successfully completing the course, student will be able to:

CO-1 Understand the complex electrical networks analysis using different network theorems.

CO-2 Understand the basic concepts and different applications of PN junction diode in different type of rectifiers, voltage regulators, solar cell, LED's etc.

CO-3 Describe the basic structure, working principle and characteristics of Bipolar Junction transistors.

CO-4 Understand and explain the classification of Amplifiers and the various coupling & feedback methods in BJT amplifiers.

REFERENCES

1. Basic Electronics andLinear Circuits,N.N.Bhargava, D.C. Kulshreshtha and S.C. Gupta (TITI CHD)
2. Solid State Electronics, J.P. Agarwal, AmitAgarwal, PragatiPrakashanMeerut
3. Electronics Fundamentalsand Applications, J.D. Ryder(Prentice Hall India)
4. Solid State Electronics, B.L.Theraja, S. Chand & Company, Delhi/Chandigarh
5. Electronic Devices and Circuits, Jacob Millman and Christos Halkias, McGraw Hill Publisher, New Delhi

B.Sc-1st year (Semester-II)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-203)
Nomenclature: Physics Practical-II

No. of credits: 2

External Marks: 40
Internal Marks: 10

Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving **Internal marks** (under Lab. Record), each college will maintain practical assessment record by using the following procedure:-
   (i) Each student has to perform a minimum number of experiments prescribed in the syllabus.
   (ii) After the completion of a practical, the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note-book. These marks will constitute the Lab. Record.
   (iii) To complete the final marks for Lab. Record a separate register for each class of B.Sc. will be maintained. The student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average, the total marks obtained will be divided by the total number of required practicals, instead of the number of practicals performed by the student. This record will be signed by the concerned teacher.
   (iv) The Lab. record register will be presented to the external practical examiners for lab. record marks. The external examiners will verify the record randomly.

The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1. To use Multimeter for measuring Resistance, A.C. and D.C. Voltage and Current, checking of electrical fuses.
2. Low resistance by Carey Foster's bridge with calibration.
3. Determination of Impedance of an A.C. circuit and its verification.
4. Frequency of A.C. mains using an electromagnet.
5. Frequency of A.C. mains Electrical vibrator.
6. High resistance by substitution method.
7. To draw forward and reverse characteristics of semiconductor diode.
8. Zener diode voltage regulation characteristics.
9. Verification of inverse square law by photo- cell.
10. To study the characteristics of Solar cell.

11. To study the characteristics of a transistor in C.B configuration.
12. To study the characteristics of a transistor in C.E. configuration.

CO No.	Course code (B-PHY-203) : Physics Practical-II After successfully completing the course, student will be able to:
CO-1	Hands on experience with the uses of multimeter.
CO-2	Characterize various devices namely PN junction diodes, LEDs, Zener diode, solar cells, PNP and NPN transistors.
CO-3	Perform the experiments to determine the values of frequency of A.C. mains, values of low and high resistances using different methods and be able to appreciate the concepts of physics involved in these experiments.
CO-4	Learn to present observations, results and analysis in suitable and presentable form.

REFERENCES

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
4. Practical Physics, S.L. Gupta and V. Kumar, PragatiPrakashan Meerut
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
6. Advanced Practical Physics for students, B.L. Flint and H.T.Worsnop, Asia Publishing House.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

REVISED SYLLABI&SCHEME OF EXAMINATION FOR

B.Sc. - II(PHYSICS)

(3rd&4thSEMESTER) EXAMINATIONS

Under Choice Based Credit System

W.E.F. SESSION 2021-22

SEMESTER-III

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-301	CC*-7	Thermal Physics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-302	CC-8	Statistical Mechanics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-303	CC-9	Physics Practical-III	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

*CC-Core Course

SEMESTER-IV

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-S1	Skill Enhancement Course in Physics (SECP-1)	(A) Applied Optics/ (B) Renewable Energy & Energy Harvesting	**02**	**02**	**40**	**10**	**50**	**3**
B-PHY-401	CC-10	Wave & Optics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-402	CC-11	Quantum Mechanics	**03**	**03**	**60**	**15**	**75**	**3**
B-PHY-403	CC-12	Physics Practical-IV	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**250**	

B.Sc-2nd (Semester-III)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-301)
Nomenclature:Thermal Physics
No. of Credits: 03

External Marks: 60
Internal Marks: 15

Time: 3 Hours

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

KINETICTHEORYOFGASES-I

Assumptionof Kinetic theoryofgases, pressureof an idealgas(withderivation), Kinetic interpretation of Temperature, Ideal Gasequation, Degree of freedom,Law of equipartition of energyandits application for specific heat ofgases, Realgases, Vander Wall's equation, Brownian motion (Qualitative).

(15 Lectures)

UNIT-II

KINETICTHEORYOFGASES-II

Maxwell's distribution ofspeed and velocities (derivation required), Experimental verification of Maxwell's law of speed distribution: mostprobable speed, average and r.m.s. speed, Meanfree path, Transport ofenergy and momentum, Diffusionof gases.

(15 Lectures)

UNIT-III

THERMODYNAMICS-I

Thermodynamic systemandZeroth law of thermodynamics, First law of thermodynamics anditslimitations,Reversibleandirreversibleprocess,Secondlawofthermodynamics anditssignificance,Carnottheorem,Absolutescaleoftemperature,AbsoluteZeroand magnitudeofeachdivisiononworkscaleandperfectgasscale,Joule'sfreeexpansion, JouleThomsoneffect,Joule-Thomson(Porousplug)experiment,conclusionsand explanation,analyticaltreatmentofJouleThomsoneffect,Entropy,calculationsof entropyofreversibleandirreversibleprocess,T-Sdiagram,entropyofaperfectgas, Nernstheatlaw (thirdlawofthermodynamics),Liquefactionofgases,(oxygen,air, hydrogen and helium) solidification of helium below 4K, Cooling by adiabatic demagnetization.

(15 Lectures)

UNIT-IV

THERMODYNAMICS-II

DerivationofClausius-ClapeyronandClausiuslatentheatequationsandtheir significance, specificheatofsaturatedvapours, phasediagram and triplepointofa substance,developmentofMaxwellthermodynamicalrelations,Thermodynamical functions:Internalenergy(U),Helmholtzfunction(F),Enthalpy (H),Gibbsfunction(G) andtherelationsbetweenthem,derivationofMaxwellthermodynamicalrelationsfrom thermodynamicalfunctions, ApplicationofMaxwellrelations:relationsbetweentwo specificheatsofgas,DerivationofClausius-ClapeyronandClausiusequation, variation ofintrinsicenergywithvolumefor(i)perfectgas(ii) Vander wallgas(iii) solidsand liquids,derivationofStefan'slaw,adiabaticcompressionandexpansionofgas& deduction of theoryof Joule Thomson effect.

(15 Lectures)

CO No. **Course code (DSCP-B-PHY-301): Thermal Physics**

After successfully completing the course, student will be able to:

CO-1 Learn about Kinetic interpretation of Temperature, the real gas equations, Van der Waal equation of state and Brownian motion.

CO-2 Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion.

CO-3 Understand the basic concepts of thermodynamics, the first and the second law of thermodynamics, JouleThomsoneffect,Joule-Thomson(Porousplug)experiment,the concept of entropy and the associated theorems,calculationsof entropyofreversible& irreversibleprocess,T-Sdiagram and Nernstheatlaw (thirdlawofthermodynamics).

CO-4 DerivetheClausius-ClapeyronandClausiuslatentheatequationsand understand their significance. The students will also be able to learn about Maxwell's thermodynamic relations their physical interpretations.

REFERENCES

1. Thermal Physics and Statistical Mechanics, S.K. Roy, New Age International Publishers, New Delhi
2. Thermodynamics and Statistical Physics,J.K.Sharma and K.K. Sarkar, Himalaya Publishing House, Bombay
3. Introduction to Thermodynamics and itsApplications,Stowe Keith,University Press (India) Pvt.Ltd,Hyderabad
4. IntroductoryThermodynamic s, PierreInfelta, BrownWalkerPress, Boca Ratan, Florida
5. Fundamentalsof Thermodynamics,J. K.Johnson, Universityof Pittsburgh2009
6. Thermodynamics andItsApplications,Jefferson Tester, Michael Modell, 3rd Edition
7. Thermodynamics, Statistical Thermodynamics & Kinetics, Thomas Engel, PhilipReid, 2nd Edition

Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-302)
Nomenclature: Statistical Mechanics
No. of Credits: 03

External Marks: 60
Internal Marks: 15

Time: 3 Hours

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

STATISTICAL PHYSICS-I

MicroscopicandMacroscopicsystems,events-mutuallyexclusive,dependentand independent.Probability,statisticalprobability,A-prioriProbabilityandrelation betweenthem,probabilitytheorems,someprobabilityconsiderations,combinations possessingmaximumprobability,combinationpossessingminimumprobability,Tossing of2,3andanynumberofCoins,Permutationsandcombinations,distributionsofN(for N=2,3,4)distinguishableandindistinguishableparticlesintwoboxesofequalsize, Micro and Macro states,Thermodynamical probability, Constraintsand Accessible states, Statisticalfluctuations,generaldistributionofdistinguishableparticlesincompartments ofdifferentsizes,Conditionofequilibriumbetweentwosystemsinthermalcontact--β parameter, Entropyand Probability(Boltzmann'srelation).

(15 Lectures)

UNIT-II

STATISTICAL PHYSICS-II

Postulatesofstatisticalphysics,Phasespace,DivisionofPhasespaceintocells,three kindsofstatistics,basicapproachinthreestatistics.M.B.statisticsappliedtoanideal gasinequilibrium-energydistributionlaw(includingevaluationofσandβ),speed distributionlaw&velocitydistributionlaw.Expressionforaveragespeed,r.m.s.speed, averagevelocity,r.m.s.velocity,mostprobableenergy&meanenergyforMaxwellian distribution.

(15 Lectures)

UNIT-III

QUANTUM STATISTICS

NeedforQuantumStatistics:Bose-Einsteinenergydistributionlaw,ApplicationofB.E. statisticstoPlanck'sradiationlawB.E.gas,DegeneracyandB.E.Condensation,Fermi-Diracenergydistributionlaw,F.D.gasandDegeneracy,FermienergyandFermi temperature, FermiDiracenergydistributionlaw,FermiDiracgas and degeneracy,Fermi

energyandFermitemperature,FermiDiracenergydistributionlawforelectrongasin metals,Zeropointenergy,Zeropointpressureandaveragespeed (at0K)ofelectrongas, Specificheatanomalyofmetalsanditssolution.M.B.distributionasalimitingcaseof B.E. andF.D. distributions, Comparison of three statistics.

(15 Lectures)

UNIT-IV

THEORY OF SPECIFIC HEAT OF SOLIDS

Dulong and Petitlaw.DerivationofDulong and Petitlawfromclassicalphysics, Specific heatatlowtemperature,Einsteintheoryofspecificheat,CriticismofEinsteintheory, Debyemodelofspecificheatofsolids,successand shortcomingsofDebyetheory, comparisonof Einstein and Debyetheories,

(15 Lectures)

CO No. **Course code (B-PHY-302): Statistical Mechanics**

After successfully completing the course, student will be able to:

CO-1 Understand the concepts of microstate, macrostate, thermodynamic probability and also understand the studies of particles with their distinguishably or indistinguishably nature and conditions which lead to the three different distribution laws e.g. Maxwell-Boltzmann distribution, Bose-Einstein distribution and Fermi-Dirac distribution laws of particles.

CO-2 Learn the basic Postulates of statistical physics, Phase space, Division of Phase space into cells and be able to derive the expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution.

CO-3 Understand the need and application of QuantumStatistics:Bose-Einstein&Fermi-Dirac statistics and be able to articulate the connection as well as dichotomy between classical statistical mechanics and quantum statistical mechanics.

CO-4 Learn and understand the different law's and theory of specific heat of solids and their significance.

REFERENCES

1. Statistical Mechanics, S. Prakash and J.P. Agarwal, KedarNathRamNath& Co, Meerut
2. Statistical Physics "BerkeleyPhysics Course.Vol. 5",Reif,McGrawHillBook Co. Ltd., New Delhi
3. Statistical Mechanics, D.A. McQuarrie, Viva Books PvtLtd., New Delhi
4. Classical and Statistical Thermodynamics, Hanna A. Rizk, Narosa Publishing House, New Delhi

B.Sc-2nd year (Semester-III)
Subject: Physics

(Course Type: Core Course, Course Code: B-PHY-303)
Nomenclature: Physics Practical-III
No. of credits: 2

External Marks: 40
Internal Marks: 10

Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving **Internal marks** (under Lab. Record), each college will maintain practical assessment record by using the following procedure:-
   (i) Each student has to perform a minimum number of experiments prescribed in the syllabus.
   (ii) After the completion of a practical, the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note-book. These marks will constitute the Lab. Record.
   (iii) To complete the final marks for Lab. Record a separate register for each class of B.Sc. will be maintained. The student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average, the total marks obtained will be divided by the total number of required practicals, instead of the number of practicals performed by the student. This record will be signed by the concerned teacher.
   (iv) The Lab. record register will be presented to the external practical examiners for lab. record marks. The external examiners will verify the record randomly.
5. The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1. Measurement of Planck constant using black body radiation.
2. To determine Stefan's Constant.
3. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
4. To determine the thermal conductivity of bad conductor by Lee and Charlton's disc method.
5. To determine the temperature co-efficient of resistance by platinum resistance thermometer.
6. To study the variation of thermo e.m.f. across two junctions of a thermocouple with temperature.

7. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge.
8. To determine Mechanical Equivalent of Heat by Callender and Barne'scontant flow method.
9. To draw a calibration curve for a thermocouple.

CO No.	Course code (B-PHY-303) : Physics Practical-III
	After successfully completing the course, student will be able to:
CO-1	Hands on experience with different instruments and appreciate the beauty of different concepts and related experiments in Physics.
CO-2	Verify some fundamental principles, effects and concepts of physics through Experiments.
CO-3	Perform basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, temperature coefficient of resistant, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a thermocouple.
CO-4	Learn to present observations, results and analysis in suitable and presentable form.

REFERENCES

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
4. Practical Physics, S.L. Gupta and V. Kumar, PragatiPrakashan Meerut
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
6. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House

(Course Type: Skill Enhancement, Course Code: B-PHY-S1(A))
Nomenclature: Applied Optics
No. of credits: 02

External Marks: 40
Internal Marks: 10
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.

UNIT-I

INTRODUCTION TO LASER

Spontaneous and Stimulated Absorption and Emission of radiation, main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification, Kinetic of optical absorption, Population inversion: A necessary condition for light amplification, resonant cavity and laser pumping.

(8 Lectures)

UNIT-II

LASER SYSTEM

Laser rate equation; Three and Four level Lasers. Principle, Construction & working of He-Ne Laser, Ruby Laser,Semiconductor junction Laser, N_2-Laser, CO_2 laser.

(7 Lectures)

UNIT-III

LASER APPLICATIONS

Spatial Frequency Filtering, Holography, Laser induced Fusion, Lasers in Isotope Separation. Application of Laser Technologyin material processing (Drilling, Cutting, Welding), Medicine, Industry and Military.

(7Lectures)

UNIT-VI

THE OPTICAL FIBER

Optical fibres and their properties, Principal of light propagation through a optical fibre,The numerical aperture, Attenuation in optical fibre and attenuation limit, Singlemode and multimode fibres, Fibre optic sensors: Fibre Bragg Grating.

(8 Lectures)

CO No.	**Course code (B-PHY-S1(A)) : Applied Optics**
	After successfully completing the course, student will be able to:
CO-1	Familiar with optical phenomena and different concepts related laser physics.
CO-2	Qualitative understanding of basic lasing mechanism, types of Lasers, characteristics of Laser Light, types of Lasers.
CO-3	Understand and appreciate the applications of Lasers in developing LED, Holography, in materials processing, in Medicine, Industry and Military.
CO-4	Have the idea of optical fibres, their properties and principle of propagation of electromagnetic waves through optical fibres.

REFERENCES

1. Optical Electronics, A.K. Ghatak and K. Thyagarajan, Cambridge University Press
2. Laser, Theory & Applications, K. Thyagarajan and A.K. Ghatak, Macmillan India limited
3. Lasers and Non-Linear Optics, B.B.Laud, New Age International (P) Ltd., Publishers, New Delhi
4. Lasers, Principles, Types and Applications, K.R. Nambiar, New Age International (P) Ltd., Publishers, New Delhi
5. Fundamental of optics, F. A. Jenkins &H. E. White, 1981, Tata McGraw Hill.
6. Optical Systems and Processes, Joseph Shamir, 2009, PHI Learning Pvt. Ltd.
7. Optoelectronic Devices and Systems, S.C. Gupta, 2005, PHI Learning Pvt. Ltd.
8. Optical Physics, A. Lipson, S.G.Lipson, H.Lipson, 4thEdn., 1996, Cambridge Univ. Press

(Course Type: Skill Enhancement, Course Code: B-PHY-S1(B))
Nomenclature:Renewable Energy and Energy Harvesting

No. of Credits: 2

External Marks: 40
Internal Marks: 10
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.

UNIT-I

FOSSIL FUELS, ALTERNATE SOURCES OF ENERGY AND SOLAR ENERGY

Fossil fuels and Nuclear Energy, theirlimitation, need of renewable energy, non-conventional energy sources. An overview ofdevelopments in Offshoredifferent types of energy. Solar Energy; its importance, storage of solar energy, solar pond, non -convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems.

(8 Lectures)

UNIT-II

OCEAN, GEOTHERMAL AND HYDRO ENERGY

Ocean Energy Potential against Wind and Solar, Wave Characteristicsand Statistics, Wave Energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.Geothermal Energy: Geothermal Resources, Geothermal Technologies.Hydro Energy: Hydropower resources, hydropower technologies, environmental impactof hydro power sources.

(8 Lectures)

UNIT-IV

WIND AND PIEZOELECTRIC ENERGY HARVESTING

Wind Energy harvesting**;**Fundamentals of Wind energy, Wind Turbines and differentelectrical machines in wind turbines, Power electronic interfaces, and gridinterconnection topologies.Piezoelectric Energy harvesting: Introduction, Physics and characteristics ofpiezoelectric effect, materials and mathematical description of

piezoelectricity,piezoelectric parameters and modeling piezoelectric generators, piezoelectric energyharvesting applications.

(8 Lectures)

UNIT-IV

ELECTROMAGNETIC ENERGY HARVESTING

Linear Generators, Physics mathematical models, recent applications, Carbon captured technologies, cell, batteries, power consumption, Environmental issues and Renewable sources of energy, sustainability

(6 Lectures)

CO No.	**Course code (B-PHY-S1(B)) : Renewable Energy and Energy Harvesting**

After successfully completing the course, student will be able to:

CO-1 Learn not only the theories of the renewable sources of energy, but also to have hands-on experiences on them wherever possible.

CO-2 Learn about the potential of Ocean, Geothermal, hydrothermal energies and technologies and their impact on environment.

CO-3 Understand and appreciate the technology of wind and piezoelectric energy harvesting.

CO-4 Have the idea of electromagnetic energy harvesting through carbon- captured technologies like cells, batteries.

REFERENCES

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal, S. Chand and Co. Ltd., New Delhi
3. Solar energy - Suhas P Sukhative Tata McGraw Hill Publishing Company Ltd.
4. Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. http://en.wikipedia.org/wiki/Renewable_energy

Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-401)
Nomenclature Waves and Optics
No. of credits: 3

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

INTERFERENCE

Interference byDivisionof Wave front:Young'sdouble slit experiment, Coherence, Conditions of interference, Fresnel's biprismand itsapplications to determine the wavelength of sodium lightand thickness of amicasheet,phasechangeon reflection. Interference byDivisionof Amplitude: Plane parallel thin film, productionof colors in thin films, classification of fringes infilms,Interference due totransmitted light and reflected light, wedgeshaped film, Newton's rings.

(15 Lectures)

UNIT-II

DIFFRACTION-I

Huygens-Fresnel's theory, Fresnel's assumptions, rectilinearpropagation of light,Fresnel's half period zones, zone plate, diffraction at a straight edge,rectangular slit and diffraction at a circular aperature. Diffraction due toa narrow slit, diffraction due to a narrow wire.

(15 Lectures)

UNIT-III

DIFFRACTION- II

Fraunhoffer diffraction:one slit diffraction, two slit diffraction, N-slit diffraction, plane transmission grating spectrum, dispersive powerofgrating, limit of resolution, Rayleigh's criterion, resolvingpower of telescopeand agrating.

(15 Lectures)

UNIT-IV

POLARIZATION

Polarization:Polarisationbyreflection,refractionandscattering, MalusLaw, Phenomenonofdoublerefraction,Huygens'swavetheoryofdoublerefraction(Normal andobliqueincidence),AnalysisofpolarizedLight.Nicolprism,Quarterwaveplateand halfwaveplate,productionanddetectionof(i)Planepolarizedlight(ii)Circularly polarizedlightand(iii)Ellipticallypolarizedlight.Opticalactivity,Fresnel'stheoryof optical rotation, Specificrotation, Polarimeters(half shade andBiquartz).

(15 Lectures)

CO No. **Course code (B-PHY-401) : Waves and Optics**

After successfully completing the course, student will be able to:

CO-1 Have understanding of Interference - by Division of Wave front, by Division of Amplitude and Interference due to transmitted light & reflected light.

CO-2 Learn about Huygens-Fresnel's theory, diffraction at a straight edge and at a circular aperture, diffraction due to a narrow slit and due to a narrow wire.

CO-3 Understand and explain the Fraunhoffer diffraction, dispersive powerofgrating, Rayleigh's criterion and resolvingpower of telescope& agrating.

CO-4 Understand the theories and laws of polarization along with understanding of the production and detection of (i)Planepolarizedlight(ii)Circularly polarizedlightand(iii)Ellipticallypolarizedlight.

REFERENCES

1. Principles of Optics, M. Born and E. Wolf, PergamamanPress
2. Fundamentals of Optics,Jenkinsand White, McGraw HillBook Co.Ltd., New Delhi
3. Optics, K.D. Muller, UniversityScienceBooks, MillallyCalifornia
4. AnIntroduction toInterferometery,Tolansky, John Wiley&Sons, NewDelhi
5. PolarizedLight Production and Use, Shurcliff, Harward UniversityPress,Cambridge, M A (USA)
6. Refresher Course in Physics Vol.II, C.L. Arora, S Chand and Co, New Delhi

B.Sc-2nd year (Semester-IV)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-402)
Nomenclature: Quantum Mechanics
No. of credits: 3

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

THE ORIGIN QUANTUM PHYSICS

Overview,scaleofquantumphysics,boundarybetweenclassicalandquantum phenomena:Blackbody radiation, Planck's quantum theory; Quantum theory of light, Photon,Photoelectriceffect,Comptoneffect(theoryandresult),Frank-Hertzexperiment,de-Brogliehypothesis.DavissonandGermerexperiment, wave packet, phase velocity, group velocity and their relation.Heisenberg's uncertaintyprinciple.Timeenergyandangularmomentum,positionuncertainty.Uncertaintyprinciplefromde Brogliewave.(Wave-particleduality).GammaRay Microscope,Electrondiffractionfromaslit.

(15 Lectures)

UNIT-II

THE SCHRODINGERWAVEEQUATION

Time dependent Schrodinger equation and dynamical evolution of a quantum state ; properties of Wave Function, Interpretation of Wave Function, probability and probability current densities in three dimensions; Condition for physical acceptability of Wave Functions. Normalization, Linearity and Superposition Principles, Eigenvalues and Eigenfunctions, Position, Linear momentum & Energy operators; commutator of position and linear momentum operators; Expectation values of position and linear momentum; Wave Function of a free Particle; Time-independent Schrodingerwaveequation, Stationary states, Eigenfunctions,Eigenvalues andtheir significance.

(15 Lectures)

UNIT-III

APPLICATION OF SCHRODINGERWAVEEQUATION TO ID PROBLEMS

(i) Particleinone-dimensionalbox(solutionofSchrodingerwaveequation, Eigenfunctions,Eigenvalues,quantizationofenergy, nodes and anti nodes, zero point energy).
(ii) Onedimensionalsteppotential: E>Vo(reflectionandtransmission coefficients).
(iii) One dimensional steppotential: E <Vo (calculationof penetration depth).
(iv) Onedimensionalpotentialbarrier:E>Vo(reflectionandtransmission Coefficients).
(v) One-dimensional potential barrier, E<Vo (calculation of reflection and penetration or tunnellingcoefficients).
(vi) SolutionofSchrodingerequationforharmonicoscillator: energy eigen functions and eigen values, Zero-pointenergy.

(15 ectures)

UNIT-IV

APPLICATION OF SCHRODINGER WAVE EQUATION TO 3D PROBLEMS

Separation of Schrodinger wave equation in Cartesian coordinates; Free particle: energy eigenfunctions and eigenvalues; Particle in a cubic potential box:normalized energy eigenfunctions and eigenvalues, non-degenerate and degenerate eigenstates; Three-dimensional anisotropic and isotropic harmonic oscillator: normalized energy eigenfunctions and eigenvalues, degeneracy; Central potentials: Separation of Schrödinger equation in spherical polar coordinates, radial and angular equations.

(15 Lectures)

CO No. **Course code (B-PHY-402) : Quantum Mechanics**

After successfully completing the course, student will be able to:

CO-1 Know main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and understand the theory of quantum measurements, wave packets and uncertainty principle.

CO-2 Understand the central concepts of quantum mechanics: wave functions, Interpretation of Wave Function, momentum and energy operator, expectation values, the Schrodinger equation, time dependent and time independent cases, probability density, the normalization techniques, Eigen functions, Eigen values and their significance.

CO-3 Understanding the behavior of quantum particle encountering a i) barrier & ii) potential.

CO-4 Solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one dimensional and three dimensional potentials.

REFERENCES

1. QuantumMechanics, LeonardI.Schiff,3rdEdn 2010, Tata McGraw Hill.
2. A Text book of Quantum Mechanics, P.M. Mathews and K. Venkatesan, 2ndEdn, 2010, McGraw Hill.

3. Quantum Mechanics, Robert Eisberg and Robert Resnick, 2nd Edn, 2002, Wiley.
4. Quantum Mechanics, G. Aruldhas, 2nd Edn 2002, PHI Learning of India.
5. Quantum Mechanics, B.H. Bransden and C.J. Joachain, Pearson Education, New Delhi.
6. IntroductoryQuantum Mechanics, David J. Griffith, 2nd Ed. 2005, Pearson Education.
7. Quantum Physics of Atoms Molecules, Solids, Nuclei and Particles, R.M. Eisberg and R. Resnick, WileyEasternLtd, New Delhi

B.Sc-2nd year (Semester-IV)
Subject: Physics
(Course Type: Core Course, Course Code: B-PHY-403)
Nomenclature: Physics Practical-IV
No. of credits: 2

External Marks: 40
Internal Marks: 10

Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving**Internal marks**(underLab. Record),eachcollege will maintainpracticalassessment record byusingthefollowingprocedure:-

(v) Each student has to perform a minimum number of experiments prescribed in the syllabus.

(vi) After thecompletionofapractical,theteacherconcernedwillcheck thenote-bookandconductheviva-voceofeachstudenttofindouthowmuch conceptsrelatedtothetheoreticalandexperimentalpartoftheexperiment he/shehasunderstood.Accordingtohis/herperformancemarkswillbe recordedontheirpracticalnote-book.ThesemarkswillconstitutetheLab. Record.

(vii) TocompletethefinalmarksforLab.Recordaseparateregisterforeach classof B.Sc.willbemaintained.Thestudentwillbeassignedaseparatepageonthis register.Onthispagethemarksobtainedbythestudentindifferentpracticals willberecorded.Whiletakingthefinalaverage,thetotalmarksobtainedwill bedividedby thetotalnumberofrequiredpracticals,insteadofthenumberof practicalsperformedbythestudent.Thisrecordwillbesignedbythe concerned teacher.

(viii) TheLab.recordregisterwillbepresentedtotheexternalpractical examinersfor lab. record marks. Theexternal examiners willverifytherecord randomly.

5. The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1 To measurethe(a)area of awindow (b) height of an inaccessible object using a sextant.
2 To determine Refractive index of the material of a prism using sodium source.
3 To determine the dispersive power and Cauchy constants of the material of a prism using Mercurydischargesource.
4 To draw agraph between wavelength and minimum deviationfor various lines froma Mercurydischargesource.
5 Determinationof wave length ofsodium lightand thenumber of lines per centimetre usingadiffraction grating.
6 Determinationof wave length ofsodium light using Newton's Rings.
7 Resolving power of a telescope.
8 Comparison ofIlluminatingPowers byaPhotometer.

9 Measurement of (a) Specific rotation (b) concentration of sugar solution using polarimeter.
10 Ordinaryandextra ordinary refractive indices for calcite or quartz.
11 Tofind the equivalentfocal length of a lens system bynodal slide assembly.

Additional particles ofQuantum Mechanics if needed may be introduced

1. To find the specific heat of a solid by a method of mixture.
2. To find the specific heat of a liquid (Turpentine oil) by law of cooling.
3. To find coefficient of apparent expansion of glycerine.

CO No. **Course code (B-PHY-403) : Physics Practical-IV**

After successfully completing the course, student will be able to:

CO-1 Hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. and resolving power of optical equipment.

CO-2 Understand various optical phenomena, principles, workings and applications optical instruments through Experiments.

CO-3 Learn to present observations, results and analysis in suitable and presentable form.

REFERENCES

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
4. Practical Physics, S.L. Gupta and V. Kumar, PragatiPrakashan Meerut
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
6. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House

KURUKSHETRA UNIVERSITY, KURUKSHETRA

REVISED SYLLABI&SCHEME OF EXAMINATION FOR

B.Sc. - III(PHYSICS)

(5th&6thSEMESTER) EXAMINATIONS

Under Choice Based Credit System

W.E.F. SESSION 2022-23

SEMESTER-V

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-501	DSE*-1	(I) Nuclear Physics (II) Mathematical Physics	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-502	DSE-2	(I) Solid State Physics (II) Medical Physics	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-503	DSE-3	(I) / (II) Physics Practical-V	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

*DSE-Discipline Specific Elective

SEMESTER-VI

Course Code	Course Type	Nomenclature	Credits	Work load Hours/Week	Marks			Duration of Exam. in Hours
					External	Internal	Total	
B-PHY-601	DSE-4	(I) Atomic & Molecular Spectroscopy (II) Elements of Modern Physics	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-602	DSE-5	(I) Digital Analogy & Instrumentation (II) Embedded System	**02**	**02**	**60**	**15**	**75**	**3**
B-PHY-603	DSE-6	(I) / (II) Physics Practical-VI	**02**	**04**	**40**	**10**	**50**	**3**
Total Marks							**200**	

B.Sc-3rd year (Semester-V)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-501(I))
Nomenclature: Nuclear Physics
No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

NUCLEAR STRUCTURE AND PROPERTIES OF NUCLEI

Nuclearcomposition(p-eandp-nhypotheses),Nuclearproperties;Nuclearsize,spin, parity,statistics,magneticdipolemoment,quadruplemoment(shapeconcept). DeterminationofmassbyBain-Bridge,Bain-BridgeandJordanmassspectrograph.DeterminationofchargebyMosleyLaw.DeterminationofsizeofnucleibyRutherford BackScattering.

(15 Lectures)

UNIT-II

NUCLEAR RADIATIONS DECAY PROCESS AND INTERACTION

Alpha-disintegrationanditstheory,Energeticofalpha-decay,Originofcontinuousbeta spectrum(neutrinohypothesis),typesofbeta-decayandenergeticofbeta-decay,Nature of gamma rays, Energetic ofgamma rays,Interactionofheavychargedparticles(Alphaparticles);Energylossofheavycharged particle(ideaofBetheformula;noderivation),Rangeandstragglingofalphaparticles. Geiger-Nuttallaw,Interactionoflightchargedparticle(Beta-particle),Energylossof beta-particles(ionization),Rangeofelectrons,absorptionofbeta-particles.Interactionof GammaRay;PassageofGammaradiationsthroughmatter(Photoelectric,Comptonand pairproductioneffect),electron-positronannihilation,AbsorptionofGammarays(Mass attenuation coefficient) and its application.

(15 Lectures)

UNIT-III

NUCLEAR ACCELERATORS AND NUCLEAR RADIATION DETECTORS

Linear accelerator,Tendem accelerator, Cyclotron and Betatronaccelerators, Gasfilledcounters;Ionizationchamber,proportionalcounter,G.M.Counter(detailed study), Scintillation counter and semiconductor detector.

(15 Lectures)

UNIT-IV

NUCLEAR REACTIONS AND NUCLEAR REACTORS

Nuclearreactions,Elasticscattering,Inelasticscattering,nucleardisintegration, Photonuclearreaction,Radiativecapture,Directreaction,Heavyionreactionsand spallation Reactions, Conservation laws, Q-valueand reaction threshold, Nuclear Reactors,GeneralaspectsofReactordesign,Nuclearfissionandfusionreactors, (Principle, construction,working and uses in brief).

(15 Lectures)

CO No. **Course code (B-PHY-501(I)): Nuclear Physics**

After successfully completing the course, student will be able to:

CO-1 Learn about nuclear composition & nuclear properties like nuclearsize,spin, parity,statistics,magneticdipolemoment,quadruplemoment and also be able to understand the basics of experimental techniques/methods to determine the mass and size of nuclei.

CO-2 Learn about the emission of alpha, beta and gamma rays, the mechanisms of the emissions of these rays, outlines of theory of alpha decay and Pauli's theory of beta decay with the neutrino hypothesis. Also Learn some basic aspects of interaction Interaction of heavy charged particles (Alpha particles) and interaction of gamma ray by photoelectric effect, Compton scattering and pair production, energy loss due to ionization.

CO-3 Understand the principles and basic constructions of particle accelerators and the detectors of nuclear radiations.

CO-4 Learn the basic aspects of nuclear reactions, the Q-value of such reaction & its derivation from conservation laws and understand the Principle, construction,working and uses of Nuclearfissionandfusionreactors.

REFERENCES

1. Nuclear Physics, 2nd Ed (1962), I. Kaplan, Oxford andIBH, NewDelhi
2. NuclearMeasurement Techniques, K. Sriram, AEWP, New Delhi
3. Introduction to Experimental Nuclear Physics, R.M. Singru, John Wiley & Sons
4. Nuclear Physics , D.C. Tayal, Himalayan Publishing House, Bombay
5. Atomic and NuclearPhysics VolII (1994), S.N. Ghoshal, S Chand &CoNew Delhi
6. BasicNuclearPhysics, B.N. Srivastava, (1993),PragatiPrakashanMeerut
7. IntroductoryNuclearPhysics, Halliday, Asia PublishingHouse, New Delhi
8. Fundamentals of Radiochemistry, D. D.Sood, A. V.R. Readyand Ramamoorthy,IANCAS(2007),BARC, Bombay.
9. Conceptsof Nuclear Physics (1998), B.L.Cohen, Tata McGrawHill, New Delhi
10. IntroductoryNuclear Physics (1988), K. S.Krane, JohnWiley&SonsNew Delhi
11. Nuclear Physics (1992), S.B. Patel, WileyEasternLtd, NewDelhi
12. NuclearPhysics (1993), R.R. Roy and B.P. Nigam, WileyEasternLtd. New Delhi.

B.Sc-3rd year (Semester-V)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-501(II))
Nomenclature: Mathematical Physics
No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

FOURIER SERIES

Periodic functions, Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only), Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients, Complex representation of Fourier series, Expansion of functions with arbitrary period, Expansion of non-periodic functions over an interval, Even and odd functions and their Fourier expansions, Application, Summing of Infinite Series.

SOME SPECIAL INTEGRALS

Beta and Gamma FunctionS, Relation between them.Expression of Integrals in terms of Gamma Functions, Error Function (Probability Integral).

(15 Lectures)

UNIT-II

CALCULUS OF FUNCTIONS OF MORE THAN ONE VARIABLE

Partial derivatives,exact and inexact differentials,Integrating factor, with simple illustration, Constrained Maximization using Lagrange Multipliers.

PARTIAL DIFFERENTIAL EQUATIONS

Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry.

(15 Lectures)

UNIT-III

FROBENIUS METHOD AND SPECIAL FUNCTIONS

Singular Points of Second Order Linear Differential Equations and their importance,Frobenius method and its applications to differential equations, Legendre, Bessel, Hermite and Laguerre

Differential Equations, Properties of Legendre Polynomials: Rodrigues Formula, Orthogonality, Simple recurrence relations.

(15 Lectures)

UNIT-IV

COMPLEX ANALYSIS

Brief Revision of Complex Numbers and their Graphical Representation, Euler's formula, De Moivre's theorem, Roots of Complex Numbers, Functions of Complex Variables, Analyticity and Cauchy-Riemann Conditions, Examples of analytic functions, Singular functions: poles and branch points, order of singularity, branch cuts, Integration of a function of a complex variable, Cauchy's Inequality, Cauchy's Integral formula.

(15 Lectures)

CO No.	**Course code (B-PHY-501(II)): Mathematical Physics**
	After successfully completing the course, student will be able to:
CO-1	Learn the Fourier analysis of periodic functions and their applications in physical problems. Learn the beta, gamma and the error functions and their applications in doing integrations.
CO-2	Acquire knowledge of methods to solve partial differential equations with the examples of important partial differential equations in Physics.
CO-3	Learn about the special functions, such as the Hermite polynomial, the Legendre polynomial, the Laguerre polynomial and Bessel functions and their differential equations and their applications in various physical problems.
CO-4	Learn about the complex numbers and their properties, functions of complex numbers and their properties such as analyticity, poles and residues.

REFERENCES

1. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier
2. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
3. Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
4. An Introduction to Ordinary Differential Equations, Earl A Coddington, 1961, PHI Learning.
5. Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
6. Essential Mathematical Methods, K.F. Riley and M.P. Hobson, 2011, Cambridge University Press
7. Partial Differential Equations for Scientists and Engineers, S.J. Farlow, 1993, Dover Publications.
8. Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Books.

B.Sc-3rd year (Semester-V)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-502(I))
Nomenclature: Solid State Physics
No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

CRYSTAL STRUCTURE I

Crystallineandglassyforms,liquidcrystals,crystalstructure,periodicity,latticeand basis,crystaltranslationalvectorsandaxes.UnitcellandPrimitiveCell,WingerSeitz primitiveCell,symmetry operationsfora twodimensionalcrystal,Bravaislatticesintwo andthreedimensions.CrystalplanesandMillerindices,Interplanerspacing,Crystal structures ofZinc Sulphide, Sodium Chloride and Diamond.

(15 Lectures)

UNIT-II

CRYSTAL STRUCTURE II

X-raydiffraction,Bragg'sLawandexperimentalX-raydiffractionmethods.K-spaceandreciprocallatticeanditsphysicalsignificance,reciprocallatticevectors,reciprocallattice to a simple cubic lattice,b.c.c. and f.c.c. lattice.

(15 Lectures)

UNIT-III

ELECTRONIC PROPERTIES OF METALLIC SOLIDS

Free electron gas model, Energy levels and density of states in one and three dimensions, Fermi momentum, Fermi energy, Fermi temperature, Effect of temperature, heat capacity of electron gas (explicit calculation), Experimental heat capacity of metals, Concept of thermal effective mass, Electrical conductivity and Ohm's law, Experimental resistivity of metals, Matthiessen's rule, Motion in magnetic fields and Hall effect, Thermal conductivity of metals and Wiedmann-Franz law.

(15 Lectures)

UNIT-IV

SUPERCONDUCTIVITY

Historicalintroduction,Survey ofsuperconductivity,Superconductingsystems,HighTc Superconductors,IsotopicEffect,CriticalMagneticField,MeissnerEffect,London TheoryandPippards'equation,ClassificationofSuperconductors(typeIandTypeII), BCSTheoryofSuperconductivity,Fluxquantization,JosephsonEffect(ACandDC), PracticalApplicationsofsuperconductivityandtheirlimitations,powerapplicationof superconductors.

(15 Lectures)

CO No. **Course code (B-PHY-502(I)): Solid State Physics**

After successfully completing the course, student will be able to:

CO-1 Have brief idea about crystalline and amorphous substances, about lattice, unit cell, primitive cell, miller indices,Bravais lattices in two & three dimensions and crystal structures of Zinc Sulphide, Sodium Chloride and Diamond.

CO-2 Acquire knowledge about X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods and about the reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c. lattice.

CO-3 Acquire knowledge about the electronic properties like electrical conductivity, resistivity, thermal conductivity, heat capacity etc. of metallic solids.

CO-4 Understand the basic idea about superconductors, their classifications and practical applications.

REFERENCES

1. IntroductiontoSolidStatePhysics, 7th Ed (1996) , C. Kittel, John Wiley&Sons, New Delhi
2. SolidStatePhysics,*AnIntroductiontoTheoryandExperiment*, H.Ibachand H.Lüth, Springer-Verlag,Berlin, 1991
3. SolidStatePhysics, S.O. Pillai, NewAgeInternational Publishers (2007) New Delhi
4. IntroductiontoSuperconductivity,M.Tinkham, McGraw-Hill, New York
5. SolidState Physics (2000), A.J. Dekkar, McMillanIndiaLtd New Delhi
6. Solid State Physics (2003), N.W. Ascroft N Wand N.D. Mermin, Harcourt Asia, Singapore
7. Solid State Physics: An introduction to theory and Experiment, H. Ibach and H.Luth
8. Solid State Physics (1993), H.V. Keer, WileyEasternLtd,New Delhi
9. Solid State Physics (1990), C.M.Kachhava, TataMcGrawHill CoLtd, New Delhi
10. Solid State Physics (1995),Gupta, Vikas PublishingHouse PvtLtd, New Delhi

B.Sc-3rd year (Semester-V)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-502(II))
Nomenclature: Medical Physics
No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

NOTE:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

PHYSICS OF THE BODY-I

Basic Anatomical Terminology: Standard Anatomical Position, Planes, Familiarity with terms like- Superior, Inferior, Anterior, Posterior, Medial, Lateral, Proximal and Distal, Mechanics of the body: Skeleton, forces, and body stability. Muscles and dynamics of body movement, Physics of Locomotors Systems: joints and movements, Stability and Equilibrium. Energy household of the body: Energy balance in the body, Energy consumption of the body, Heat losses of the body, Thermal Regulation. Pressure system of body: Physics of breathing, Physics of cardiovascular system.

PHYSICS OF THE BODY-II

Acoustics of the body: Nature and characteristics of sound, Production of speech, Physics of the ear, Diagnostics with sound and ultrasound. Optical system of the body: Physics of the eye. Electrical system of the body: Physics of the nervous system, Electrical signals and information transfer.

(15 Lectures)

UNIT-II

PHYSICS OF DIAGNOSTIC AND THERAPEUTIC SYSTEMS-I

X-Rays: Electromagnetic spectrum, production of X-rays, X-ray spectra, Brehmsstrahlung, Characteristic X-ray. X-ray tubes & types: Coolidge tube, X-ray tube design, tube cooling stationary mode, Rotating anode X-ray tube, Tube rating, quality and intensity of X-ray. X-ray generator circuits, half wave and full wave rectification, filament circuit, kilo voltage circuit, types of X-Ray Generator, high frequency generator, exposure timers and switches, HT cables, HT generation.

RADIATION PHYSICS

Radiation units exposure, absorbed dose, units: rad, gray, relative biological effectiveness, effective dose, inverse square law, Interaction of radiation with matter Compton & photoelectric effect, Rem & Sievert, linear attenuation coefficient.

RADIATION DETECTORS

Thimble chamber, condenser chambers, Geiger Muller counter, Scintillation counters and Solid State detectors, ionization chamber, Dosimeters, survey methods, area monitors, TLD, Semiconductor detectors.

(15 Lectures)

UNIT-III

MEDICAL IMAGING PHYSICS

Evolution of Medical Imaging, X-ray diagnostics and imaging, Physics of nuclear magnetic resonance (NMR), NMR imaging, MRI Radiological imaging, Ultrasound imaging, Physics of Doppler with applications and modes, Vascular Doppler. Radiography: Filters, grids, cassette, X-ray film, film processing, fluoroscopy. Computed tomography scanner- principle & function, display, generations, mammography.Thyroid uptake system and Gamma camera (Only Principle, function and display).

PHYSICS OF DIAGNOSTIC AND THERAPEUTIC SYSTEMS-II

Diagnostic nuclear medicine: Radiopharmaceuticals for radioisotope imaging, Radioisotope imaging equipment, Single photon and positron emission tomography. Therapeutic nuclear medicine: Interaction between radiation and matter Dose and isodose in radiation treatment. Medical Instrumentation: Basic Ideas of Endoscope and Cautery, Sleep Apnea and Cpap Machines, Ventilator and its modes.

(15 Lectures)

UNIT-IV

RADIATION ONCOLOGY PHYSICS

External Beam Therapy (Basic Idea): Telecobalt, Conformal Radiation Therapy (CRT), 3DCRT, IMRT, Image Guided Radiotherapy, EPID, Rapid Arc, Proton Therapy, Gamma Knife, Cyber Knife, Contact Beam Therapy (Basic Idea): Brachytherapy-LDR and HDR, Intra Operative Brachytherapy, Radiotherapy, kilo voltage machines, deep therapy machines, Telecobalt machines, Medical linear accelerator, Basics of Teletherapy units, deep x-ray, Telecobalt units, medical linear accelerator, Radiation protection, external beam characteristics, dose maximum and build up – bolus, percentage depth dose, tissue maximum ratio and tissue phantom ratio, Planned target Volume and Gross Tumour Volume.

RADIATION AND RADIATION PROTECTION

Principles of radiation protection,protective materials-radiation effects, somatic, genetic stochastic and deterministic effect. Personal monitoring devices: TLD film badge, pocket dosimeter, OSL dosimeter, Radiation dosimeter, Natural radioactivity, Biological effects of radiation, Radiation monitors, Steps to reduce radiation to Patient, Staff and Public, Dose Limits for Occupational workers and Public. AERB: Existence and Purpose.

(15 Lectures)

CO No.	Course code (B-PHY-502(II)): Medical Physics
	After successfully completing the course, student will be able to:
CO-1	Learn about the human body, its anatomy, physiology and biophysics, the Physics of the senses, exploring its performance as a physical machine.
CO-2	Gain knowledge with reference to working of various diagnostic tools, medical imaging techniques, how ionizing radiation interacts with matter, how it affects living organisms and how it is used as a therapeutic technique and radiation safety practices.
CO-3	Have functional knowledge regarding need for radiological protection and the sources of an approximate level of radiation exposure for treatment purposes.
CO-4	Gain a broad and fundamental understanding of Physics while developing particular expertise in medical applications.

REFERENCES

1. Medical Physics, J.R. Cameron and J.G. Skofronick, Wiley (1978)
2. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)
3. Christensen's Physics of Diagnostic Radiology: Curry, Dowdey and Murry - Lippincot Williams and Wilkins (1990)
4. Physics of Radiation Therapy: F M Khan - Williams and Wilkins, Third edition (2003)
5. Physics of the human body, Irving P. Herman, Springer (2007).
6. The essential physics of Medical Imaging: Bushberg, Seibert, Leidholdt and Boone Lippincot Williams and Wilkins, Second Edition (2002)
7. Handbook of Physics in Diagnostic Imaging: R.S. Livingstone: B.I. Publication Pvt Ltd.

B.Sc-3rd year (Semester-V)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-503(I))
Nomenclature: Physics Practical-V
No. of credits: 2

External Marks: 40
Internal Marks: 10

Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving **Internal marks** (under Lab. Record), each college will maintain practical assessment record by using the following procedure:-

(i) Each student has to perform a minimum number of experiments prescribed in the syllabus.

(ii) After the completion of a practical, the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note-book. These marks will constitute the Lab. Record.

(iii) To complete the final marks for Lab. Record a separate register for each class of B.Sc. will be maintained. The student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average, the total marks obtained will be divided by the total number of required practicals, instead of the number of practicals performed by the student. This record will be signed by the concerned teacher.

(iv) The Lab. record register will be presented to the external practical examiners for lab. record marks. The external examiners will verify the record randomly.

5. The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1. Study of Hysteresis curve by CRO.
2. To measure the resistivity of a semiconductor (Ge) crystal with temperature by Four Probe Method(from room temperature to 150 ^{o}C) and to determine its band gap.
3. To measure the Dielectric constant of a dielectric materials with frequency.
4. To determine the elastic constant of quartz crystal.
5. Velocity of Ultrasonic waves by grating formation in CCl_4.
6. To determine the Hall coefficient of a semiconductor sample.
7. To find the magnetic susceptibility of a solids.

8. To study the PE Hysteresis curve of a ferroelectric crystal.
9. To draw the Platue of G.M. Counter.
10. To draw the Mass Attenuation coefficient by G.M. Counter.

CO No.	Course code (B-PHY-503(I)) : Physics Practical-V
	After successfully completing the course, student will be able to:
CO-1	Perform experiments to determine resistance & band gap of semiconductor materials and be able to study the ferroelectric properties of ferroelectric materials.
CO-2	Familiar with the use and proper handling of different instruments such as CRO, dielectric setup, G.M.Counter, Gauss meter etc.
CO-3	Draw the platue of G.M. Counter & determine the Mass Attenuation coefficient by G.M. Counter.
CO-4	Learn to present observations, results and analysis in suitable and presentable form.

REFERENCES

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
2. Advanced Level Practical Physics, M.Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi
4. Practical Physics , S.L. Gupta and V. Kumar, PragatiPrakashan Meerut
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar
6. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop,1971, Asia Publishing House

(Course Type: Discipline Specific Elective, Course Code: B-PHY-503(II))
Nomenclature: Physics Practical-V
No. of credits: 2

External Marks: 40
Internal Marks: 10
Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving**Internal marks**(underLab. Record),eachcollege will maintainpracticalassessment record byusingthefollowingprocedure:-

(i) Each student has to perform a minimum number of experiments prescribed in the syllabus.

(ii) After thecompletionofapractical,theteacherconcernedwillcheck thenote-bookandconducttheviva-voceofeachstudenttofindouthowmuch conceptsrelatedtothetheoreticalandexperimentalpartoftheexperiment he/shehasunderstood.Accordingtohis/herperformancemarkswillbe recordedontheirpracticalnote-book.ThesemarkswillconstitutetheLab. Record.

(iii) TocompletethefinalmarksforLab.Recordaseparateregisterforeach classof B.Sc.willbemaintained.Thestudentwillbeassignedaseparatepageonthis register.Onthispagethemarksobtainedbythestudentindifferentpracticals willberecorded.Whiletakingthefinalaverage,thetotalmarksobtainedwill bedividedby thetotalnumberofrequiredpracticals,insteadofthenumberof practicalsperformedbythestudent.Thisrecordwillbesignedbythe concerned teacher.

(iv) TheLab.recordregisterwillbepresentedtotheexternalpractical examinersfor lab. record marks. Theexternal examiners willverifytherecord randomly.

5. The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

MATHEMATICAL PHYSICS

The aim of this course is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- Highlights the use of computational methods to solve physical problems.
- Use of computer language as a tool in solving physics problems (applications).
- The course will consist of lectures (both theory and practical) in the Computer Lab.
- Evaluation done not on the programming but on the basis of formulating the problem.
- Aim at teaching students to construct the computational problem to be solved.
- Students can use anyone operating system Linux or Microsoft Windows

Topics	Description with Applications

Introduction and Overview	Computer architecture and organization, memory and Input/output devices.
Basics of scientific computing	Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow & overflowemphasize the importance of making equations in terms of dimensionless variables, Iterative methods.
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.
Review of C & C++ Programming fundamentals	Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator. Goto Statement. Switch Statement. Unconditional and Conditional Looping. While-Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops), Arrays (1D&2D) and strings, user defined functions, Structures and Unions, Idea of classes and objects.
Programs: using C/C++ language	Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending-descending order, Binary search.
Random number generation	Area of circle, area of square, volume of sphere, value of pi (π)
Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods	Solution of linear and quadratic equation, solving $\alpha = \tan\alpha$; $I = I_o((Sin\ \alpha\ \|\alpha\ )^2$in optics
Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation	Evaluation of trigonometric functions e.g. Sin θ, Cos θ, tan θ, etc.
Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method	Given Position with equidistant time data to calculate velocity and acceleration and vice-versa. Find the area of B-H Hysteresis loop
Solution of Ordinary Differential Equations (ODE) First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods	First order differential equation • Radioactive decay • Current in RC, LC circuits with DC source • Newton's law of cooling • Classical equations of motion Attempt following problems using RK 4 order method: • Solve the coupled differential equations $\frac{dx}{dy}$ = y + x$-\frac{x3}{3}$; $\frac{dy}{dx}$ = -xfor four initial conditions x(0) = 0, y(0) = -1, -2, -3, -4.

	Plot x vs y for each of the four initial conditions on the same screen for $0 \leq t \leq 15$ The differential equation describing the motion of a pendulum is $\frac{d2\theta}{dt2} = -Sin\theta$. The pendulum is released from rest at an angular displacement α, i.e. υ (0)= αand υ'(0) = 0. Solve the equation for α = 0.1, 0.5 and 1.0 and plot υ as a function of time in the range $0 \leq t \leq 8\pi$. Also plot the analytic solution valid for small υ(sin(υ) = υ

MEDICAL PHYSICS

1. Understanding the working of a manual Hg Blood Pressure monitor and measure the Blood Pressure.
2. Understanding the working of a manual optical eye-testing machine and to learn eye-testing.
3. Correction of Myopia (short sightedness) using a combination of lenses on an optical bench/breadboard.
4. Correction of Hypermetropia/Hyperopia (long sightedness) using a combination of lenses on an optical bench/breadboard.
5. To learn working of Thermoluminescent dosimeter (TLD) badges and measure the background radiation.
6. Familiarization with Geiger-Muller (GM) Counter and to measure background radiation.
7. Familiarization with Radiation meter and to measure background radiation.
8. Familiarization with the Use of a Vascular Doppler.

CO No. **Course code (B-PHY-503(II)) : Physics Practical-V**

After successfully completing the course, student will be able to:

CO-1 Acquire proficiency in computing integrations and in solving differential equations by various methods. Also be able to learn about the basic theory of errors, their analysis, and estimation with examples of simple experiments in Physics.

CO-2 Learn the fundamentals of the C and C++ programming languages and their applications in solving simple physical problems involving interpolations, differentiations, integrations, differential equations as well as finding the roots of equations.

CO-3 Have hands-on and gain knowledge with reference to working of various diagnostic tools and medical equipment.

CO-4 Acquire a broad and fundamental understanding of Physics while developing particular expertise in medical applications and appreciate the applications of Physics to clinical medicine.

REFRENCES

1. Introduction to Numerical Analysis, S.S. Sastry, 5thEdn., 2012, PHI Learning Pvt. Ltd.
2. Schaum's Outline of Programming with C++. J.Hubbard, 2000, McGraw-Hill Publications.
3. Numerical Recipes in C++: The Art of Scientific Computing, W.H. Pressetal., 3rdEdn., 2007, Cambridge University Press.
4. A first course in Numerical Methods, Uri M. Ascher and Chen Greif, 2012, PHI Learning.
5. Elementary Numerical Analysis, K.E. Atkinson, 3rdEdn., 2007, Wiley India Edition.
6. Numerical Methods for Scientists and Engineers, R.W. Hamming, 1973, Courier Dover Pub.
7. An Introduction to Computational Physics, T. Pang, 2ndEdn., 2006, Cambridge Univ. Press.
8. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003).
9. Christensen's Physics of Diagnostic Radiology: Curry, Dowdey and Murry - Lippincot Williams and Wilkins (1990)
10. Physics of Radiation Therapy: F M Khan - Williams and Wilkins, Third edition (2003).
11. The essential physics of Medical Imaging: Bushberg, Seibert, Leidholdt and Boone Lippincot Williams and Wilkins, Second Edition (2002).
12. The Physics of Radiology-H E Johns and Cunningham.
13. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
14. Handbook of Physics in Diagnostic Imaging: Roshan S. Livingstone: B. I. Publications Pvt Ltd.
15. A Text Book of Practical Physics, InduPrakash and Ramakrishna, 11th Edition, 2011, KitabMahal, New Delhi.

B.Sc-3rd year (Semester-VI)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-601(I))
Nomenclature: Atomic and Molecular Spectroscopy

No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

Note:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

HISTORICALBACKGROUNDOFATOMICSPECTROSCOPY

Introductionofearlyobservations,emissionandabsorptionspectra,atomicspectra,wave number,spectrumofHydrogenatominBalmerseries,Bohratomicmodel(Bohr'spostulates), spectraofHydrogenatom,explanationofspectralseriesinHydrogenatom,un-quantizedstates andcontinuousspectra,spectralseriesinabsorptionspectra,effectofnuclearmotiononline spectra(correctionoffinitenuclearmass),variationinRydbergconstantduetofinitemass,short comingsofBohr'stheory,Wilsonsommerfeldquantizationrule,de-Broglieinterpretationof Bohrquantization law,Bohr's correspondingprinciple, Sommerfeld's extensionof Bohr'smodel, Sommerfeldrelativisticcorrection,ShortcomingsofBohr-Sommerfeldtheory,Vectoratom model**;** spacequantization,electronspin,couplingoforbitalandspinangularmomentum, spectroscopictermsandtheirnotation,quantumnumbersassociatedwithvectoratommodel, transition probabilityandselection rules.

(15 Lectures)

UNIT-II

VECTORATOMMODEL(SINGLEVALANCEELECTRON)

Orbitalmagneticdipolemoment(Bohrmegnaton),behaviorofmagneticdipolein external magnetic filed;Larmors' precession andtheoremPenetratingandNon-penetratingorbits,Penetratingorbitsontheclassicalmodel**;** Quantumdefect,spinorbitinteractionenergyofthesinglevalanceelectron,spinorbit interactionforpenetratingandnon-penetratingorbits.quantummechanicalrelativity correction,Hydrogenfinespectra,MainfeaturesofAlkaliSpectraandtheirtheoretical interpretation,termseriesandlimits,Rydeburg-Ritzecombinationprinciple,Absorption spectraofAlkaliatoms.observeddoubletfinestructureinthespectraofalkalimetals anditsInterpretation,Intensityrulesfordoublets,comparisonofAlkalispectraand Hydrogen spectrum.

(15 Lectures)

UNIT-III

VECTORATOMMODEL(TWOVALANCEELECTRON)

EssentialfeaturesofspectraofAlkaline-earthelements,Vectormodelfortwovalance electron atom:application of spectra. CouplingSchemes;LSorRussell–SaundersCouplingSchemeandJJcouplingscheme, InteractionenergyinL-Scoupling(sp,pdconfiguration),Landeintervalrule,Pauli principalandperiodicclassificationoftheelements.InteractionenergyinJJCoupling (sp,pdconfiguration),equivalentandnon-equivalentelectrons,Twovalanceelectron system-spectraltermsofnon-equivalentandequivalentelectrons,comparisonofspectral termsinL-SAndJ-Jcoupling.Hyperfine structureofspectrallinesandits origin;isotope effect,nuclear spin.

(15 Lectures)

UNIT-IV

ATOMINEXTERNALFIELD

ZeemanEffect(normalandAnomalous),Experimentalset-upforstudyingZeemaneffect, ExplanationofnormalZeemaneffect(classicalandquantummechanical),Explanationof anomalousZeemaneffect(Landeg-factor), ZeemanpatternofD1andD2linesofNa-atom,Paschen-Backeffectofasinglevalenceelectronsystem.WeakfieldStarkeffectof Hydrogen atom.

MOLECULAR PHYSICS

General Considerations,Electronic StatesofDiatomic Molecules, Rotational Spectra (Far IRandMicrowaveRegion),VibrationalSpectra(IRRegion),RotatorModelofDiatomic Molecule, Raman Effect,Electronic Spectra.

(15 LECTURES)

CO No. **Course code (B-PHY-601(I)) : Atomic and Molecular spectroscopy**

After successfully completing the course, student will be able to:

CO-1 Acquire knowledge about the historical background and developments of atomic spectroscopy through the study of spectral series in Hydrogen atom, effect of nuclear motion on line spectra (correction of finite nuclear mass), short comings of Bohr's theory, Wilson sommerfeld quantization rule, Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory and finally Vector atom model.

CO-2 Understand and explain the vector atom model, various coupling schemes and atomic spectra of one and two electron atoms.

CO-3 Explain the influence on the spectra of atoms in the presence of external applied electric and magnetic field i.e. Zeeman effect, Paschen-Back effect, Stark effect.

CO-4 Have basic idea about the rotational, vibrational and rotational-vibrational spectra of diatomic molecules and basic idea of Raman Effect.

REFERENCES

1. Concept of Modern Physics(1987), A. Beiser, McGrawHill CoLtd. New Delhi
2. Atomic Physics (2007), J.B. Rajab, S Chand & Co, New Delhi
3. Atomic Physics VolII (1991), J.H.Fewkes and J. Yarwood, Oxford UniversityPress
4. Physics of Atomsand Molecules 2nd Ed(2009), B.H.Bransden and C.J. Joachain, Pearson Education, New Delhi
5. Fundamental of Molecular Spectroscopy,Colin N.Banwell and Elaine M. McCash, McGrawHill CoLtd. New Delhi
6. Atomic and NuclearPhysics VolI (1996) S.N. Ghoshal, S. Chand & Com., New Delhi
7. Atomic and Nuclear Physics (1982), K. Gopalkrishnan, McMillanIndia, New Delhi
8. Elements ofSpectroscopyS.L.Gupta, V. Kumar and R.C.Sharma, PragatiPrakashan, Meerut.

B.Sc-3rd year (Semester-VI)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-601(II))

Nomenclature: Elements of Modern Physics
No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

Note:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.

UNIT-I

INTRODUCTION TO MODERN PHYSICS

Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering, De Broglie wavelength and matter waves; DavissonGermer experiment, Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.

(15 Lectures)

UNIT-II

HEISENBERG UNCERTAINTY PRINCIPLE AND SCHRODINGER WAVE EQUATION

Position measurement-gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle. Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wave function, probabilities and normalization; Probability and probability current densities in one dimension.

(15 Lectures)

UNIT-III

APPLICATION OF SCHRODINGER WAVE EQUATION

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension -across a step potential and across a rectangular potential barrier, Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy.

(15 Lectures)

UNIT-IV

BASIC CONCEPT IN NUCLEAR PHYSICS

Radioactivity: stability of nucleus; Law of radioactive decay; Mean life & half-life; α-decay; β-decay-energy released, spectrum and Pauli's prediction of neutrino; γ-ray emission. Fission and fusion, mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with U^{235} Fusion and thermonuclear reactions.

(15 LECTURES)

CO No. **Course code (B-PHY-601(II)) : Elements of Modern Physics**

After successfully completing the course, student will be able to:

CO-1 Know main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and ability to discuss and interpret experiments that reveal the dual nature of matter.

CO-2 Understand the theory of quantum measurements, wave packets and uncertainty principle.

CO-3 Understand the central concepts of quantum mechanics: wave functions, momentum and energy operator, the Schrodinger equation, time dependent and time independent cases, probability density and the normalization techniques, skill development on problem solving e.g. one dimensional rigid box, tunneling through potential barrier, step potential, rectangular barrier.

CO-4 Understanding the properties of and structure of atomic nuclei, liquid drop model and nuclear shell model and mass formula. Acquire the ability to calculate the decay rates and lifetime of radioactive decays like alpha, beta, gamma decay.

REFERENCES

1. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill
2. Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A.Dubson,2009, PHI Learning
3. Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGraw Hill
4. Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co.
5. Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning.
6. Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill

B.Sc-3rd year (Semester-VI)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-602(I))

Nomenclature: Digital and Analog Circuits & Instrumentation
No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

Note:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

DIGITAL CIRCUITS

Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, Logic Gates: AND, OR and NOT (Their realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gates. De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra. Fundamental Products: Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (i) Sum of Products Method and (ii) Karnaugh Map.

(15 Lectures)

UNIT-II

COMBINATIONAL LOGIC CIRCUITS

Binary Addition, Binary Subtraction (using 2's Complement Method). Half Adders and Full Adders, and Subtractors, 4-bit binary Adder-Subtractor. Decoder: Binary-coded-decimal (BCD) system, BCD-to-decimal decoder, Demultiplexer: 4-to-16 line decoder, decoder/lamp driver, Multiplexer (Data selector): Applications- Parallel to serial conversion, sequential data selection; Encoders. Seven segment Display, BCD-to-seven segment decoder.

(15 Lectures)

UNIT-III

OPERATIONAL AMPLIFIERS (BLACK BOX APPROACH)

Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain.CMRR, concept of Virtual ground. Applications of Op-Amps: (i) Inverting and Non-inverting Amplifiers, (ii) Adder, (iii) Subtractor, (iv) Differentiator, (v) Integrator, (vi) Zero Crossing Detector (vii) Electronic analog computation (viii) Square wave generator (ix) Triangular wave generator.

(15 Lectures)

UNIT-IV

INSTRUMENTATIONS

Digital to analog converters: Weighted resistor type D/A converter, Ladder type D/A converter; Analog to Digital converter. Timer IC: IC 555 Pin diagram and its application as Astable&MonostableMultivibrator. Introduction to CRO: Block diagram of CRO, Applications of CRO (i) Study of Waveform (ii) Measurement of Voltage, Current, Frequency and Phase Difference.

(15 Lectures)

CO No.	Course code (B-PHY-602(I)) : Digital and Analog Circuits & Instrumentation
	After successfully completing the course, student will be able to:
CO-1	Difference between analog and digital circuits and acquire knowledge about number systems, their interconversions, Basic logic gates, synthesis of circuits using Boolean algebra and Conversion of a Truth Table into an Equivalent Logic Circuit by (i) Sum of Products Method and (ii) Karnaugh Map.
CO-2	Understand and explain about the various Combinational digital systems like Half adders, full adders, BCD-to-decimal decoder, Demultiplexer, Multiplexer etc. and also be able to appreciate the applications of these devices.
CO-3	Realize the basics characteristics and implementation of operational amplifier for various applications like addition, subtraction, differentiation, integration, Waveform generator-square wave generator.
CO-4	Acquire knowledge about digital to analog and analog to digital signal conversion. Also understand the working and application of CRO.

REFERENCES

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill.
3. Microelectronic Circuits, M.H. Rashid, 2nd Edn.,2011, Cengage Learning.
4. Modern Electronic Instrumentation & Measurement Tech., Helfrick& Cooper, 1990, PHI Learning.
5. Digital Principles & Applications, A.P. Malvino, D.P. Leach &Saha, 7th Ed., 2011,Tata Mc-Graw Hill
6. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
7. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
8. OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd.

B.Sc-3rd year (Semester-VI)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-602(II))
Nomenclature:

Embedded System: Introduction to Microcontroller

No. of Credits: 2

External Marks: 60
Internal Marks: 15
Time: 3 hrs.

Note:-

1. Nine Questions willbe set in total and attempt five questions in all.
2. Questionnumber1willbecompulsoryandwillbebasedonthe conceptual aspectsofentiresyllabus. Thisquestionmayhave at least fivepartsandtheanswer shouldbe in briefbutnotinYes/ No.
3. Formorequestionsaretobeattempted,selectingonequestionout oftwo questions set fromeach unit. Each question maycontaintwo or more parts.
4. 20% numerical problems are to be set.
5. Use of scientific(non-programmable)calculator is allowed

UNIT-I

EMBEDDED SYSTEM ITRODUCTION, DESIGN & DEVELOPMENT

Introduction to embedded systems and general purpose computer systems, architecture of embedded system, classifications, applications and purpose of embedded systems, challenges and design issues in embedded systems, operational and non-operational quality attributes of embedded systems,Embedded system design and development: Embedded system development environment, file types generated after cross compilation, disassembler/ decompiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded industry.

(15 Lectures)

UNIT-II

REVIEW OF MICROPROCESSORS

Organization of Microprocessor based system, 8085μp pin diagram and architecture, concept of data bus and address bus, 8085 programming model, instruction classification, subroutines, stacks and its implementation, delay subroutines, hardware and software interrupts.8051 microcontroller: Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

(15 Lectures)

UNIT-III

8051 I/O PORT PROGRAMMING

Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description and their functions, I/O port programming in 8051, (Using Assembly Language), I/O programming: Bit manipulation.Programming of 8051: 8051addressing modes and accessing memory using various addressing modes, assembly language instructions using each addressing mode, arithmetic & logic instructions, 8051 programming in C:- for time delay and I/O operations and manipulation, for arithmetic & logic operations, for ASCII and BCD conversions.

(15 Lectures)

UNIT-IV

TIMER AND COUNTER PROGRAMMING

Programming 8051 timers, counter programming.SERIAL PORT PROGRAMMING WITH AND WITHOUT INTERRUPT: Introduction to 8051 interrupts, programming timer interrupts, programming external hardware interrupts and serial communication interrupt, interrupt priority in the 8051. INTERFACING 8051 MICROCONTROLLER TO PERIPHERALS: Parallel and serial ADC, DAC interfacing, LCD interfacing. PROGRAMMING EMBEDDED SYSTEMS:Structure of embedded program, infinite loop, compiling, linking and locating, downloading and debugging.

(15 LECTURES)

CO No. **Course code (B-PHY-602(II)) : Embedded System: Introduction to Microcontroller**

After successfully completing the course, student will be able to:

CO-1 Acquire knowledge about the embedded systems including its generic architecture, design and classifications, Embedded processors and microcontrollers.

CO-2 Learn about the organization of intel microprocessor 8085, its architecture, pin diagram, timing diagram, instruction set and programming in assembly language.

CO-3 Understand the organization of Intel 8051 microcontroller, its architecture, instruction set, programming and its memory organization, timing diagram and Input/output operations and manipulation for arithmetic and logical operations.

CO-4 Acquire knowledge about programming with and without interrupt service request. Interfacing parallel and serial ADC and DAC.

REFERENCES

1. Embedded Systems: Architecture, Programming & Design, R. Kamal, 2008, Tata McGraw Hill
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
3. Embedded Microcomputer System: Real Time Interfacing, J.W. Valvano, 2000, Brooks/Cole
4. Embedded Systems and Robots, SubrataGhoshal, 2009, Cengage Learning
5. Introduction to embedded system, K.V. Shibu, 1st Edition, 2009, McGraw Hill
6. Microcontrollers in practice, I.Susnea and M.Mitescu, 2005, Springer.
7. Embedded Systems: Design & applications, 1/e S.F. Barrett, 2008, Pearson Education India
8. Embedded Microcomputer systems: Real time interfacing, J.W.Valvano 2011,Cengage Learning

B.Sc-3rd year (Semester-VI)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-603(I))
Nomenclature: Physics Practical-VI

No. of credits: 2

External Marks: 40
Internal Marks: 10
Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving**Internal marks**(underLab. Record),eachcollege will maintainpracticalassessment record byusingthefollowingprocedure::-
   - **(i)** Each student has to perform a minimum number of experiments prescribed in the syllabus.
   - **(ii)** After thecompletionofapractical,theteacherconcernedwillcheck thenote-bookandconducttheviva-voceofeachstudenttofindouthowmuch conceptsrelatedtothetheoreticalandexperimentalpartoftheexperiment he/shehasunderstood.Accordingtohis/herperformancemarkswillbe recordedontheirpracticalnote-book.ThesemarkswillconstitutetheLab. Record.
   - **(iii)** TocompletethefinalmarksforLab.Recordaseparateregisterforeach classof B.Sc.willbemaintained.Thestudentwillbeassignedaseparatepageonthis register.Onthispagethemarksobtainedbythestudentindifferentpracticals willberecorded.Whiletakingthefinalaverage,thetotalmarksobtainedwill bedividedby thetotalnumberofrequiredpractical's,insteadofthenumberof practical'sperformedbythestudent.Thisrecordwillbesignedbythe concerned teacher.
   - **(iv)** TheLab.recordregisterwillbepresentedtotheexternalpractical examinersfor Lab. record marks. Theexternal examiners willverifytherecord randomly.

The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1. Determination of specific charge (e/m) by Thomson method.
2. To find Plank's constant.
3. Rydberg Constant by Hydrogen gas spectrum.
4. To determine the ionization potential of mercury.
5. To study the absorption spectra of iodine and to determine its dissociation energy.
6. To design a CB &CE amplifier of a given gain (mid-gain) using voltage divider bias.
7. To measure (a) Voltage, and (b) Frequency of a periodic waveform using a CRO
8. To verify and design AND, OR, NOT and XOR gates using NAND gates.
9. To minimize a given logic circuit. 4. Half adder, Full adder and 4-bit Binary Adder.
10. Adder-Subtractor using Full Adder I.C.
11. To study IV characteristics of PN diode, Zener and Light emitting diode
12. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
13. To design a non-inverting amplifier of given gain using Op-amp 741 and study its Frequency Response.

14. To study a precision Differential Amplifier of given I/O specification using Opamp.
15. To investigate the use of an op-amp as a Differentiator
16. To design a Wien Bridge Oscillator using an op-amp.

CO No. **Course code (B-PHY-603(I)) : PHYSICS PRACTICAL-VI**

After successfully completing the course, student will be able to:

CO-1 Perform experiments to determine specific charge (e/m) by Thomson method, Plank's constant, Rydberg Constant etc.

CO-2 Perform experiments to realize the applications of different analog and digital devices like Operational amplifier, basic logic gates, Half & Full adders/Subtractors, Zener and Light emitting diode etc.

CO-3 Design and study CB & CE amplifier and also be able to carry out the Measurement of voltage and frequency of a periodic waveform using CRO.

CO-4 Have in-depth knowledge about the electronic circuit fundamentals, making of electrical connections and handling of instruments.

REFERENCES

1. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi.
2. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi.
3. Practical Physics, S.S. Srivastava and M.K. Gupta, Atma Ram & Sons, Delhi.
4. Practical Physics , S.L. Gupta and V. Kumar, PragatiPrakashan Meerut.
5. Modern Approach to Practical Physics, R.K. Singla, Modern Publishers, Jalandhar.
6. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop,1971, Asia Publishing House.
7. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.
8. Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
9. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, PrenticeHall.
10. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

B.Sc-3rd year (Semester-VI)
Subject: Physics
(Course Type: Discipline Specific Elective, Course Code: B-PHY-603(II))
Nomenclature: Physics Practical-VI
No. of credits: 2
External Marks: 40

Internal Marks: 10
Time: 3 Hours Max.

Distribution of External Marks:

Experiment	25 marks
Viva- voce	15 marks
Internal Marks (based on Lab Record)	10 marks
Total	50 marks

NOTE:-

1. Do any eight experiments from the list given.
2. The students are required to perform and calculate the error involved in a particular experiment in the final examination.
3. The Practical examination will be held in a single session of 3 hours.
4. Forgiving **Internal marks** (under Lab. Record), each college will maintain practical assessment record by using the following procedure:-

   Each student has to perform a minimum number of experiments prescribed in the syllabus.

   (i) After the completion of a practical, the teacher concerned will check the note-book and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded on their practical note-book. These marks will constitute the Lab. Record.

   (ii) To complete the final marks for Lab. Record a separate register for each class of B.Sc. will be maintained. The student will be assigned a separate page on this register. On this page the marks obtained by the student in different practicals will be recorded. While taking the final average, the total marks obtained will be divided by the total number of required practical's, instead of the number of practical's performed by the student. This record will be signed by the concerned teacher.

   (iii) The Lab. record register will be presented to the external practical examiners for lab. record marks. The external examiners will verify the record randomly.

   (iv) The size of each group for the practical paper may be 15 to 20 students.

LIST OF EXPERIMENTS

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine value of Planck's constant using LEDs of at least 4 different colours.
4. To determine the ionization potential of mercury.
5. To determine the absorption lines in the rotational spectrum of Iodine vapour.
6. To study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photo sensor and compare with incoherent source – Na light.
7. To determine the value of e/m by magnetic focusing.
8. To setup the Millikan oil drop apparatus and determine the charge of an electron.
9. To find that the given numbers is prime or not using 8051.
10. To find the factorial of a number using 8051.
11. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number using 8051.
12. Using 8051, Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's.

13. Using 8051; Program to glow first four LED then next four using TIMER application.
14. Program to rotate the contents of the accumulator first right and then leftusing 8051.
15. Application of embedded systems: Temperature measurement, some information on LCD display, interfacing a keyboard Using 8051.

CO No. **Course code (B-PHY-603(II)) : Physics Practical-VI**

After successfully completing the course, student will be able to:

CO-1 Perform experiments to determine value of Boltzmann constant, work function of material of filament of directly heated vacuum diode, ionization potential of mercury etc.

CO-2 Study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photo sensor and compare with incoherent source – Na light.

CO-3 Design, fabricate, test and run the programs using 8051 microprocessor.

CO-4 Learn the applications of embedded systems such as temperature measurement, acquiring some information on LCD display and interfacing a keyboard Using 8051.

REFERENCES

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, InduPrakash and Ramakrishna, 11th Edition, 2011, KitabMahal, New Delhi.
4. Embedded Systems: Architecture, Programming & Design, R. Kamal, 2008, Tata McGraw Hill
5. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
6. Embedded Microcomputor System: Real Time Interfacing, J.W. Valvano, 2000, Brooks/Cole
7. Embedded System, B.K. Rao, 2011, PHI Learning Pvt. Ltd.
8. Embedded Microcomputer systems: Real time interfacing, J.W.Valvano 2011,Cengage Learning.

Kurukshetra University Kurukshetra

Scheme of Examinations & syllabus for B.Sc. Non-Medical Programme for the subject of Electronics under choice based credit system (CBCS) w.e.f.2020-21 in phased manner

Semester-I

Paper Code	Course opted	Nomenclature	Credits	Hours/ week	Marks			Duration of Exam in hour
					Ext.	Int.	Total	
AECC-101	AECC Course-I English/Environmental Studies	English or Environmental Studies	2	2	40	10	50	3
DSCP-102	Core Course-I (Physics)		3	3	60	15	75	3
DSCP-103	Core Course-II (Physics)		3	3	60	15	75	3
DSCP-104	Core Course (Physics Practical-I)		2	4	40	10	50	3
DSCM-105	Core Course-I (Mathematics)		3	3	60	15	75	3
DSCM-106	Core Course-II (Mathematics)		3	3	60	15	75	3
DSCM-107	Core Course (Mathematics Practical-I)		2	4	40	10	50	3
DSCE-108	Core Course-I (Electronics)	Electronic Devices and Circuits-I	3	3	60	15	75	3
DSCE-109	Core Course-II (Electronics)	Network Analysis	3	3	60	15	75	3
DSCE-110	Core Course (Electronics Practical-I)	Practicals	2	4	40	10	50	3
		Total	26	32	520	130	650	

Semester-II

Paper Code	Course opted	Nomenclature	Credits	Hours/ week	Marks			Duration of Exam in hour
					Ext.	Int.	Total	
AECC-201	AECC Course-II English/Environmental Studies	English or Environmental Studies	2	2	40	10	50	3
DSCP-202	Core Course-III (Physics)		3	3	60	15	75	3
DSCP-203	Core Course-IV (Physics)		3	3	60	15	75	3
DSCP-204	Core Course (Physics Practical-II)		2	4	40	10	50	3
DSCM-205	Core Course-III (Mathematics)		3	3	60	15	75	3
DSCM-206	Core Course-IV (Mathematics)		3	3	60	15	75	3
DSCM-207	Core Course (Mathematics Practical-II)		2	4	40	10	50	3
DSCE-208	Core Course-III (Electronics)	Electronic Devices and Circuits-II	3	3	60	15	75	3
DSCE-209	Core Course-IV (Electronics)	Digital Electronics	3	3	60	15	75	3
DSCE-210	Core Course (Electronics Practical-II)	Practicals	2	4	40	10	50	3
		Total	26	32	520	130	650	

Semester-III

Paper Code	Course opted	Nomenclature	Credits	Hours/ week	Marks			Duration of Exam in hour
					Ext.	Int.	Total	
SEC-301	Skill Enhancement Course-I	SECE1: Computer Fundamental	2	2	40	10	50	3
DSCP-302	Core Course-V (Physics)		3	3	60	15	75	3
DSCP-303	Core Course-VI (Physics)		3	3	60	15	75	3
DSCP-304	Core Course (Physics Practical-III)		2	4	40	10	50	3
DSCM-305	Core Course-V (Mathematics)		3	3	60	15	75	3
DSCM-306	Core Course-VI (Mathematics)		3	3	60	15	75	3
DSCM-307	Core Course (Mathematics Practical-III)		2	4	40	10	50	3
DSCE-308	Core Course-V (Electronics)	Op-amp and Linear Integrated Circuits	3	3	60	15	75	3
DSCE-309	Core Course-VI (Electronics)	Combinational and Sequential Circuits	3	3	60	15	75	3
DSCE-310	Core Course (Electronics Practical-III)	Practicals	2	4	40	10	50	3
AECC-311	Hindi/Sanskrit		2	2	40	10	50	3
		Total	28	34	560	140	700	

Semester-IV

Paper Code	Course opted	Nomenclature	Credits	Hours / week	Marks			Duration of Exam in hour
					Ext.	Int.	Total	
SEC-401	Skill Enhancement Course-II	SECP	2	2	40	10	50	3
DSCP-402	Core Course-VII (Physics)		3	3	60	15	75	3
DSCP-403	Core Course-VIII (Physics)		3	3	60	15	75	3
DSCP-404	Core Course (Physics Practical-IV)		2	4	40	10	50	3
DSCM-405	Core Course-VII (Mathematics)		3	3	60	15	75	3
DSCM-406	Core Course-VIII (Mathematics)		3	3	60	15	75	3
DSCM-407	Core Course (Mathematics Practical-IV)		2	4	40	10	50	3
DSCE-408	Core Course-VII (Electronics)	Sinusoidal Oscillators and Multivibrators	3	3	60	15	75	3
DSCE-409	Core Course-VIII (Electronics)	Advanced Digital Electronics	3	3	60	15	75	3
DSCE-410	Core Course (Electronics Practical-IV)	Practicals	2	4	40	10	50	3
		Total	26	32	520	130	650	

Semester-V

Paper Code	Course opted	Nomenclature	Credits	Hours / week	Marks			Duration of Exam in hour
					Ext.	Int.	Total	
SEC-501	Skill Enhancement Course-III	SECE3: Basic Electrical Engineering & Skills	2	2	40	10	50	3
DSEP-502	Discipline Specific Elective-I (Physics)	DSEP1 / DSEP2	2	2	40	10	50	3
DSEP-503	Discipline Specific Elective-II (Physics)	DSEP3 / DSEP4	2	2	40	10	50	3
DSEP-504	Discipline Specific Elective Physics Practical-V		2	4	40	10	50	3
DSEM-505	Discipline Specific Elective-I (Mathematics)	DSEM1 / DSEM2	2	2	40	10	50	3
DSEM-506	Discipline Specific Elective-II (Mathematics)	DSEM3 / DSEM4	2	2	40	10	50	3
DSEM-507	Discipline Specific Elective (Mathematics Practical-V)		2	4	40	10	50	3
*DSEE-508	Discipline Specific Elective-I (Electronics)	DSEE1: Microprocessor Architecture and Programming with 8085 / DSEE2: Digital Signal Processing	2	2	40	10	50	3
*DSEE-509	Discipline Specific Elective-II (Electronics)	DSEE3: Electronic Communication / DSEE4: Electronic Instrumentation	2	2	40	10	50	3
DSEE-510	Discipline Specific Elective(Electronics Practical-V)	Practicals	2	4	40	10	50	3
		Total	20	26	400	100	500	

* DSEE - A student can opt any two theory paper.

Semester-VI

Paper Code	Course opted	Nomenclature	Credits	Hours per week	Marks			Duration of Exam in hour
					Ext.	Int.	Total	
SEC-601	Skill Enhancement Course-IV	SECE4: SECP2	2	2	40	10	50	3
DSEP-602	Discipline Specific Elective-III(Physics)	DSEP5 DSEP6	2	2	40	10	50	3
DSEP-603	Discipline Specific Elective-IV(Physics)	DSEP7 DSEP8	2	2	40	10	50	3
DSEP-604	Discipline Specific Elective (Physics Practical-VI)		2	4	40	10	50	3
DSEM-605	Discipline Specific Elective-III (Mathematics)	DSEM5 DSEM6	2	2	40	10	50	3
DSEM-606	Discipline Specific Elective-IV (Mathematics)	DSEM7 DSEM8	2	2	40	10	50	3
DSEM-607	Discipline Specific Elective(Mathematics Practical-VI)		2	4	40	10	50	3
*DSEE-608	Discipline Specific Elective-III (Electronics)	DSEE5: Interfacing Peripheral Devices and Applications of 8085 DSEE6: Verilog and FPGA based System Design	2	2	40	10	50	3
*DSEE-609	Discipline Specific Elective-IV (Electronics)	DSEE7: Introduction to C and its programming DSEE8: Modern Communication Systems	2	2	40	10	50	3
DSEE-610	Discipline Specific Elective(Electronics Practical-VI)	Practicals	2	4	40	10	50	3
		Total	20	26	400	100	500	
		Grand Total	146	182	2920	730	3650	

* DSEE - A student can opt any two theory paper.

Note: Each credit equals one hour/week for theory & two hours/week for practical teaching load.

Programme Outcomes (POs) for Three Year B.Sc. Programme (Course Electronics)

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems
PO4	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings'
PO5	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO6	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO7	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO8	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout the life
PO9	Environment and Sustainability	Ability to design and develop modern systems which are environmentally sensitive and to understand the importance of sustainable development.
PO10	Ethics	Apply ethical principles and professional responsibilities in scientific practices
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

Programme Specific Outcomes (PSOs) for Three Year B.Sc. Programme (Course Electronics)

PSO1	Students will be able to acquire the basic understanding of the electronic components, principles, working and applications of the electronic devices.
PSO2	Explore technical knowledge in diverse areas of Electronics and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.
PSO3	Students will acquire experimental skills, research aptitude in the area of electronics that will make them capable of contributing to the academic as well as industrial growth of the country.

Semester-I to VI
Course: B.Sc.
Subject: Electronics
Instruction for the Examiners

1. Syllabus in each Theory Paper in each semester is divided in 4 units.
    i. A student is required to attempt 5 questions in all.
    ii. Question No 1 is compulsory, consisting of short answer type questions based on all the 4 units.
    iii. Two questions will be set from each unit. A student is required to attempt one question from each unit.
    iv. All questions carry equal marks.
2. Use of simple calculator is permissible.
    i. Instructions should be imparted using SI system of units. Familiarity with CGS system of units should also be ensured.
3. Distribution of Marks: 60*+15*.
   Each theory question paper will be of 60 marks of 3 hours duration and 15 marks in each theory paper are to be awarded through internal assessment in each semester.
4. Work load – three hours per week per theory paper.
5. Practical classes to be conducted during odd as well as even semester.
6. The Practical examination will be held at the end of each semester in one sitting of 3 hours.
7. A candidate is required to perform minimum 6 experiments out of the list provided during course of study in each semester.
8. Distribution of Marks: 40*+10*
   Each practical examination in each semester will be of 40 marks of 3 hours duration and 10 marks in each practical paper are to be awarded through internal assessment in each semester.
    1. Paper Practical – 40 Marks of 3 Hours duration
    2. Lab Record: 10
    3. Experiments: 20
    4. Viva/Voce: 10
9. Maximum 10 students in one group of practical during course of study and also in examination.

Note: Each credit equals one hour/week for theory teaching load.

Each credit equals two hours/week for practical teaching load.

Semester-I
Course: B.Sc.
Subject: Electronics
Paper No : DSCE-108
Nomenclature: -Electronic Devices and Circuits-I

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are
1. To make the students familiar with the concepts of physics involved in the working of various electronic devices like PN Diode, Zener Diode and Bipolar Junction Transistor (BJT).
2. To make the students understand various applications of PN junction Diode and Transistor.

Course Outcome: After the end of this paper, the students will be able
1. To understand the physics behind the semiconductors.
2. To understand the construction, working & applications of various semiconductor diodes and transistors.
3. To understand various configurations of transistor and their equivalent circuits.

Mapping of Course Outcomes to Program Outcomes:

CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	2	-	3	--	2	2	3	3	3	2
CO2	3	3	3	3	3	3	3	--	--	2	3	3	3	2
CO3	3	3	3	3	3	3	3	2	2	2	3	3	3	2

Unit –I

Introduction to Semiconductors: - Intrinsic and Extrinsic semiconductors, Energy Band diagram, drift and diffusion currents in semiconductors (Basic idea only), Junction diode and its characteristics, Space charge capacitance and diffusion capacitance (Basic idea only), Zener diode, Voltage Regulation using Zener Diode (Basic Idea), shunt and series clipping circuit., clamping circuit.

Unit-II

Rectifiers: - HWR, FWR, Bridge FWR, calculation of rectifier parameters.
Filter circuits: L, C, LC (Calculation of ripple factor for capacitor filter only), Voltage multiplier Circuit.

Unit –III

Bipolar Junction Transistor: - Potential curves in unbiased and biased transistor, Transistor current components, Early effect, Static Characteristics of CB & CE configuration, active, cut off and

saturation regions. Transistor current gains (Alpha, Beta, and Gama)

Unit-IV

Transistor Model: - Transistor as an Amplifier, Ebers-moll model of transistor, Hybrid-Model of transistor, Emitter follower, calculation of transistor amplifier parameters using h-model, comparison of transistor amplifier configuration, Millers – theorem and its dual

Reference Books:

1. Integrated Electronics by Millman and Halkias.
2. Basic Electronics and Linear Circuits by NN Bhargava, DC Kulshreshtha (TTTI)
3. Electronics Devices and Circuit by Allen Mottershead

Semester –I
Course: B.Sc.
Subject: Electronics
Paper No : DSCE-109
Nomenclature: -Network Analysis

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objective of teaching this paper is to make

1. the students familiar with various network theorems
2. the students familiar with Two-Port Networks

Course Outcome: After the end of this paper, the students will be able to

1. Understanding and apply Mesh and Nodal analysis in electronic circuits.
2. Understand different network theorems and their applications in analyzing electronic circuits.
3. Understand different types of two-port networks and parameters. Also they will be able to analyze their performance.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit-I

Network Theorems-I: -Concept of voltage and current sources, Kirchoff's Voltage Law, Kirchoff's Current Law, Mesh Analysis, Nodal Analysis, Source Transformation Technique, Star-Delta Transformation, Superposition Theorem, Examples and problems of each topic.

Unit-II

Network Theorems-II: -Thevenin's Theorem, **Norton's** Theorem, Reciprocity Theorem, Maximum Power Transfer Theorem, Duals and Duality, Millman's Theorem, examples and problems of each topic.

Unit –III

Two–port Network-I: -Open Circuit Impedance(Z) Parameters, Short Circuit Admittance (Y) Parameters, Transmission(ABCD) Parameters, Inverse Transmission (A'B'C'D') Parameters, Hybrid(H) Parameters, Inverse Hybrid(g) Parameters, Inter Relationships of different parameters.

Unit –IV

Two–port Network-II: -Conversion of Parameters, Dependent sources (CCCS, VCVS, VCCS, CCVS), Inter Connection of Two – Port Networks, T and π Representation, Terminated Two-Port Networks, Lattice Networks, Image Parameters

Reference Books:

1. Circuits and Networks by A. Sudhakar, Shyammohan
2. Network Analysis, Publication Khanna by G.K. Mithal
3. Network Analysis, Publication Pearson India by M.E. Van Valkenburg

Semester-I

Paper Code: DSCE-110

Core Course (Electronics Practical-I)

Programme	Course Credit	Practical Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	4	10	40	50	3 Hours

Course Objectives

The objective of teaching this practical paper is

1. To learn the use of various electronic equipment used for analysis of basic analog circuits.
2. To learn the operation of multimetre, CRO and function generator.
3. To design various circuits on bread board using desecrate components.
4. To learn the functioning of wave shaping circuits.
5. To Analyze and interpret experimental data.

Course Outcome

After the end of this paper, the students will be able

1. To operate various equipment used in the design and analysis of basic electronic circuits.
2. To Design electronics circuits based on semiconductor devices and passive components.
3. To present the experimental results and conclusions in the form of written report in clear and concise manner.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	3
CO3	3	3	2	3	3	3	3	--	--	3	3	3	3	2

Note: A candidate is required to perform minimum 6 experiments out of the list provided during course of study in this semester.

1. To study the V-I characteristics of PN junction diode.
2. To study the zener diode as voltage regulator.
3. To study half wave voltage multiplier circuits using diode.
4. To study HWR and FWR and measurement of ripple factor with and without C filter.
5. To study diode as shunt clipping clement.
6. To study diode as clamping element.
7. Study of CB characteristics and calculation of H parameter from graph.
8. Study of CE characteristics and calculation of H parameter from graph.
9. Measurement of voltage, Time period and phase-shift using CRO.
10. Measurement of resistance value using colour codes and multimeter. Also design and verify the potential divider arrangement using resistances.
11. To verify maximum power transfer theorem for DC network.
12. To study the application of Superposition theorem.
13. To study the application of Thevnin theorem.
14. To study the application of Norton theorem.
15. To study RC circuit as integrating and differentiating circuits.

Semester-II
Course: B.Sc.
Subject: Electronics
Paper No : DSCE- 208
Nomenclature: - Electronic Devices and Circuits –II

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the students understand the concept of operating point and its stability of a transistor.
2. To impart knowledge to students about Multistage Amplifier and its Frequency Response.
3. To make the students familiar with the working of JFET and MOSFET transistors and their characteristics.

Course Outcome: After the end of this paper, the students will be able

1. To bias the transistor properly using a suitable biasing circuit.
2. To understand and analyze the circuits of the Amplifiers.
3. To understand the difference between FET and BJT transistors and their working.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit-I

Transistor Biasing Techniques-I: -Why Bias a Transistor, Selection of Operating Point, need for Bias Stabilization, Requirement of a Biasing Circuit, Different Biasing Circuits: Fixed-Bias Circuit, Collector-to-base Bias Circuit.

Unit-II

Transistor Biasing Techniques-II: - Bias Circuit with Emitter Resistor, Voltage Divider Biasing Circuit, Emitter-Bias Circuit, and Gain of a multi-stage amplifier.

Unit-III

Coupling Techniques: - How to couple two stages, Resistance-Capacitance Coupling, Transformer Coupling, Direct Coupling, Frequency Response Curve of an RC-Coupled Amplifier of two stage: Fall of Gain in Low-frequency Range, fall in gain of high Frequencies, Bandwidth of an amplifier.

Unit-IV

Field Effect Transistor: - Junctions Field Effect Transistor, Qualitative Description of JFET, Drain and transfer characteristics of JFET, FET small signal low frequency model, CS & CD low frequency model, MOSFET -Depletion and enhancement and their drain & transfer characteristics, CMOS (Basic idea).

Reference Books:

1. Basic Electronics and Linear Circuits by NN Bhargava, D C Kulshreshtha
2. Integrated Electronics by Millman and Halkian
3. Electronics Devices and Circuit by Allen Mottershead

Semester-II
Course: B.Sc.
Subject-Electronics
Paper No : DSCE- 209
Nomenclature:-Digital Electronics

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the students familiar with various number systems and their inter-conversion.
2. To acquaint the students with basic logic gates, Boolean algebra and hardware minimization techniques used while designing digital circuits.
3. To impart knowledge to students about various logic families and arithmetic combinational circuits.

Course Outcome: After the end of this paper, the students will be able
1. To convert a number from one system to another number system.
2. To design a digital circuit with optimized hardware required.
3. To understand various logic families and combinational circuits.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit-I

Number Systems: - Binary, Octal, Hexadecimal number system and base conversions, Binary Arithmetic operations, 1's and 2's complement representation and their arithmetic, Binary codes- BCD, Grey, cyclic, Error detecting and correcting codes, ASCII, EBCDIC, BCD addition.

Unit-II

Logic Gates and Boolean Algebra: -Logic Level: Positive and Negative logic level, Logic Gates: AND, OR, NOT, XOR, XNOR, NOR, NAND (Definition, Symbols& Truth table).

Boolean Algebra: Postulates, Duality Principle, De Morgan's Law, Simplification of Boolean Identities, Standard SOP & POS Forms, Simplification using K-map (upto 4 variables), don't care condition, implementation of SOP & POS form using NAND and NOR Gate.

Unit III

Logic families: - Unipolar & Bipolar Logic families, characteristics of Digital IC's (fan in, fan out, propagation delay. Noise Margin, level of Gating), RTL (NOR), DTL (NAND),TTL (NAND), CMOS Logic gate (NAND, NOR).

Unit-IV

Combinational Circuit:-Design principle of combinational circuit: Half adder, full adder, half subtractor, full subtractor, Railway track switching system, common light switching for a group of flats, Parity Generator.

Reference Books:

1. Digital Electronics by R.P. Jain
2. Digital Computer Electronics by Aalbert Paul Malvino.

Semester-II

Paper Code: DSCE-210

Core Course (Electronics Practical-II)

Programme	Course Credit	Practical Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	4	10	40	50	3 Hours

Course Objectives

The objective of teaching this practical paper is

1. To learn the use of various electronic equipment used for analysis of basic analog & digital circuits.
2. To designing various circuits on bread board using discrete components & IC.
3. To Analyze and interpret experimental data.

Course Outcome

After the end of this paper, the students will be able

1. To operate various equipment used in the design and analysis of basic analog & digital circuits.
2. To Design electronics circuits based on semiconductor devices and passive components.
3. To present the experimental results and conclusions in the form of written report in clear and concise manner.

Mapping of Course Outcomes to Program Outcomes:

CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	3	3	3	3	3

Note: A candidate is required to perform minimum 6 experiments out of the list provided during course of study in this semester.

1. Study of fixed bias arrangement for transistors.
2. Study of voltage divider biasing arrangement for transistors.
3. Study of two stage R-C coupled transistor amplifier.
4. Study of JFET characteristics.
5. Design of basis logic gates using discrete components.
6. Study of DTL NAND gate.
7. Study of TTL NAND gate.
8. Digital trainer using AND, OR & NOT gates.
9. Digital trainer using NAND gates.
10. Design a half adder using IC 7400.
11. Design a full adder using two half adders.
12. Study of parity generator/checker.

Semester-III
Course: B.Sc
Subject: Electronics
Paper No: DSCE-308
Nomenclature: - Op-amp and Linear Integrated Circuits

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the students familiar with various amplifiers.
2. To acquaint the students with basic differential amplifier and their applications.
3. To impart knowledge to the students about various steps used in fabricating IC.
4. To understand the working principle of various regulated power supplies and their applications.

Course Outcome: After the end of this paper, the students will be able

1. To use operational amplifier in different application based circuits.
2. To know how integrated circuits are used to reduce the complex circuitry.
3. To use regulated power supply in various electronic equipments.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit-I

Operational Amplifier- I:

Double ended differential Amplifier, differential gain, Common-mode gain, CMRR, ideal operational amplifier, Basic Concept of Feedback in Op-amp, Inverting & non-inverting configuration, Summing amplifier, Difference amplifier.

Unit-II

Operational Amplifier- II:

Error sources in OP-Amp: Offset Voltages, input bias Current, input offset current, scalar multiplier, Division and Multiplication, effect of error sources on inverting, non-inverting configuration, integrating circuit, differentiating circuit, 1^{st} order active filter using op-amp: LPF, HPF, Band Pass Filter.

Unit-III

I.C. Fabrication Technology:

Basics of Integrated Circuit Technology, Monolithic fabrication technique, Different Fabrication Processes: Crystal growth, epitaxial growth, Oxidation, Masking and Etching, Diffusion of Impurities, Metallization, Transistors for Monolithic Circuits (NPN & PNP), Monolithic Diodes, Integrated Resistors, Classification of ICs (SSI, MSI, LSI and VLSI).

Unit-IV

Regulated Power Supply:

Principle of voltage regulation, Zener diode shunt regulator, BJT shunt regulator and BJT series voltage regulator, power supply regulation using op-amp, load regulation, short circuit protection ,current regulation using op. amp., Block Diagram of three terminal IC regulator(78xx, 79xx,), Boosted power supply

Ref: 1) Electronics for Scientist & Engineers by Vishwanathan, Mehta

2) Op-amp and Linear Integrated Circuit by Ramakant A Gayakward

3) Integrated Electronics by Millman&Halkias

4) Electronic Devices and Circuits Discrete and Integrated by Y N Bapat.

Semester-III
Subject: Electronics
Paper No: DSCE-309
Nomenclature:-Combinational and Sequential Circuits

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the students familiar with various combinational and sequential circuits.
2. To acquaint the students with various types of counters and registers.

Course Outcome: After the end of this paper, the students will be able

1. To design various combinational circuits used for many applications in digital system.
2. To design any counter circuit for a specific use.
3. To understand various types of registers and the applications of registers to store the digital data.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT -I

Combinational Circuits: Multiplexers, Demultiplexer, Decoder, Encoder, Parity bit generator and checker, Code Converter: BCD to Seven Segment, BCD to Cyclic Code, Binary to Decimal, Binary to Gray, Binary to Excess-3, Application of combinational circuit: adder circuit using Multiplexers, Boolean expression implementation using Multiplexer, Boolean expression implementation using Demultiplexer

UNIT -II

Sequential Circuits : Basic Sequential circuit, Asynchronous and Synchronous circuits, RS FF and JK Flip Flop, Race Around Condition, Master Slave JK flip flop, T and D Flip Flop, Excitation Table, Conversion of Flip Flop, State Diagram.

UNIT -III

Counters: Asynchronous Binary Counters, Asynchronous Mod-N Counter, Synchronous counter: Design principle of Modulo- N Counters, UP-Down counters, Decade Counter, BCD Counter.

Unit IV

Registers: Shift Registers, Serial-in serial out (SISO), Serial-in-parallel out (SIPO), parallel-in-serial-out (PISO) parallel-in-parallel-out (PIPO), Bi-directional shift register, Applications of shift register:Ring counter, Johnson Counter, Time delay, Sequence Generator

Reference Books:

1) Digital E1ectronics &Micro computers - R. K. Gaur (4 th edition)

2) Modern Digital Electronics - R.P. Jain (4th edition)

3) Digital Principles and Applications by Leach Donald, Malvino AP (6 th Edition)

4) Digital fundamentals by R.P. Jain & Floyd.

Semester-III

Paper Code: DSCE-310

Core Course (Electronics Practical-III)

Programme	Course Credit	Practical Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	4	10	40	50	3 Hours

Course Objectives

The objective of teaching this practical paper is

1. To learn the use of various ICs used in digital and analog circuits.
2. To design various combinational and sequential circuits on bread board using ICs.
3. To learn the functioning of operational amplifier.
4. To Analyze and interpret experimental data.

Course Outcome

After the end of this paper, the students will be able

1. To implement various combinational and sequential circuits.
2. To implement application oriented circuits using Op-amp IC 741.
3. To present the experimental results and conclusions in the form of written report in clear and concise manner.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	2	3	3	3	3
CO2	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	3	3	3	3	2

Note: A candidate is required to perform minimum 6 experiments out of the list provided during course of study in this semester.

1. Study of different type of analog and digital IC's: functions, pin diagram, block diagram of 741, 7400, 7402, 7404,7408,7432,7474,7476,7490,74153,74155.
2. Operational amplifier as (1) Unity gain buffer (2) Inverting amplifier (3) Non-inverting amplifier.
3. Operational amplifier as: (1) Summing amplifier (2) Difference amplifier.
4. Measurement of offset voltage, bias currents & CMRR of an operational amplifier.
5. To design a Schmitt Trigger circuit using Operational Amplifier.
6. Study and design of an integrating circuit using op-amp IC 741.
7. To study a 4:1 Multiplexer.
8. To study a 1:4 De- Multiplexer.
9. Code Converter.
10. To verify the functionality of J-K , D and T Flip-Flops using 7400 and 7476 ICs.
11. Ripple Binary Counter
12. MOD-N Counter (Synch/Asynch)
13. Up-Down Counter (Synch/Asynch)

Semester-IV

Course: B.Sc
Subject: Electronics
Paper No: DSCE-408
Nomenclature: - Sinusoidal Oscillators and Multivibrators

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with classification of amplifiers and feedback concept.
2. To make the students familiar with various amplifiers and their efficiency.
3. To acquaint the students with the design concepts of oscillators and multivibrators.

Course Outcome: After the end of this paper, the students will be able

1. To use the feedback concept as per the requirement of the circuit.
2. To understand various types of amplifiers and their applications.
3. To use oscillators and multivibrators in various applications depending on frequency and shape of waveforms.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit-I

Amplifiers & Feedback: Classification of Amplifiers (voltage, current, Transconductance, Transresistance amplifier), Feedback concept, calculation of transfer gain in degenerative and regenerative feedbacks, Feedback topologies, Effect of negative feedback on gain, Non-linear distortion, Frequency response, Effect of negative voltage shunt feedback on inputand output resistance, Effect of negative voltage series feedback on input and output resistance, Effect of negative current shunt feedback on input and output resistance, Effect of negative current series feedback on input and output resistance.

Unit-II

Power Amplifiers: Basic Circuit and working only of: Class A large scale amplifier, push pull amplifier, transformer coupled amplifier, Class B amplifier, Class AB amplifier, Darlington-pair, efficiency.

Unit-III

Oscillators: Principle of oscillations, condition for sustained oscillation (Barkhausen criterion), stability of oscillator, Principle, working and frequency calculation of RF oscillators (Hartley oscillator,

Colpitts oscillator, crystal oscillator) and AF Oscillators (Wien Bridge oscillator, R-C Phase-shift oscillator)

Unit- IV

Multivibrators: Astable Multivibrator, Bistable Multivibrator, Monostable Multivibrator using BJT, Silicon controlled Rectifier (SCR), Triac, Diac, Triangular waveform generator, Schmitt Trigger, 555 Timer: Block diagram of 555 and its application as Astable & Monostable Multivibrator.

Ref: 1) Basic Electronics Solid state by B.L. Theraja.

2) Opamp and linear circuits by Ramakant A Gayakward.

3) Electronics for Scientist & Engineers by Vishvanathan& Mehta.

Semester-IV
Course: B.Sc
Subject: Electronics
Paper No.: DSCE-409
Nomenclature: - Advance Digital Electronics

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	3	3	15	60	75	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with Digital to analog conversion and analog to digital conversion.
2. To make the students familiar with various memory and their parameters.
3. To acquaint the students with the design concepts of Programmable Logic devices.

Course Outcome: After the end of this paper, the students will be able

1. To use the DAC and ADC as per the requirement of the circuit.
2. To understand various types of memory and their applications.
3. To understand and implement different types of digital electronic circuits using programmable logic devices and FPGA.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit -I

Digital to Analog conversion: DAC conversion, Types of DAC conversion, Weighted Resistor Type DAC, R-2R Ladder Type DAC, The Switched Current source type DAC, The Switched Capacitor type DAC, DAC accuracy and resolution

Unit II

Analog to Digital Conversion: ADC conversion, Types of ADC conversion, The Counter Type ADC, The Tracking type ADC, Flash type ADC, The Successive Approximation ADC, ADC accuracy and resolution

Unit III

Memories: Parameters of memory**,** Volatile and non volatile memories, Memory organization & operation, ROM, PROM, EPROM, EEPROM, RAM (Static and dynamic), Expanding the size of memory, Content addressable memory/ associative memory,

Unit IV

Programmable Logic Devices (PLDs): Introduction, ROM as a PLD, Programmable Logic Array(PLA), Programmable Array Logic(PAL), Features of PLD, Complex Programmable Logic Devices(CPLDs), Field Programmable Gate Array(FPGA).

Reference Books:

1. Modern Digital Electronics - R.P. Jain
2. Digital Principles and Applications by Leach Donald, Malvino AP (6 th Edition)

Semester-IV

Paper Code: DSCE-410

Core Course (Electronics Practical-IV)

Programme	Course Credit	Practical Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	4	10	40	50	3 Hours

Course Objectives

The objective of teaching this practical paper is

1. To learn the use of various ICs used in digital and analog circuits.
2. To design various oscillators and DAC circuits on bread board using ICs.
3. To learn the functioning of oscillators and multivibrators.
4. To Analyze and interpret experimental data.

Course Outcome

After the end of this paper, the students will be able

1. To design various low frequency and high frequency oscillator circuits.
2. To implement application oriented circuits using timer IC 555.
3. To implement DAC and analyse its characteristics.
4. To present the experimental results and conclusions in the form of written report in clear and concise manner.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO4	3	3	2	3	2	3	3			3	3	3	3	3

Note: A candidate is required to perform minimum 6 experiments out of the list provided during course of study in this semester.

1. Study of different type of analog and digital IC's: functions, pin diagram, block diagram of 555, 7476,4001,4011,4081,4071,4077,4009.
2. To study the design of Hartley oscillator & measure its frequency.
3. To study the design of Colpitt's oscillator & measure its frequency.
4. To study the design of Phase shift oscillator & measure its frequency.
5. To study the design of Wein bridge oscillator & measure its frequency.
6. To study and design Astable multivibrator using IC 555.
7. To study and design Monostable multi vibrator using IC 555.
8. To design a transistorized astable multivibrator and measure its frequency.
9. Study of characteristic of UJT.
10. To design saw tooth wave generator using UJT.
11. To design a 4-bit weighted type DAC and measure its resolution.
12. To design a 4-bit ladder type DAC and measure its resolution.

Semester-V

Course: B.Sc.
Subject: Electronics
Paper No: SEC-501
Nomenclature: Basic Electrical Engineering & Skills

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with ac fundamental, concept of magnetic & A.C. circuits.
2. To make the students familiar with balanced three phase systems and electrical machines.
3. To acquaint the students with the single phase transformer and electrical installations.

Course Outcome: After the end of this paper, the students will be able

1. To understand the basic fundamentals of electrical & magnetic circuits.
2. To analyze the different types of ac circuits.
3. To understand the concepts of three phase systems and electrical installations.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit-I

AC Fundamentals: Sinusoidal periodic voltage/current signal, instantaneous and peak values, polar & rectangular form of representation of impedances and phasor quantities. Addition & subtraction of two or more phasors/ AC signals using component resolution method. RMS and average values of general, full wave and half wave rectified sinusoidal wave.

Concept of magnetic circuits: Fleming's RH &LH Rule, RH Screw rule, Relation between MMF & Reluctance. Hysteresis& Eddy current phenomenon.

Unit-II

A.C. Circuits: Behavior of various components fed by A.C. source (steady state response of pure R, pure L, pure C, RL, RC, RLC series with waveforms of instantaneous power, voltage & current on simultaneous time axis scale and corresponding phasor diagrams), power factor, active, reactive & apparent/Complex power. Frequency response (Tuning) of RLC Series & standard Parallel (RL II C) ckts. including resonance, cut-off frequency & bandwidth. Generation of single phase AC (working of single coil dynamo with slip rings).

Unit-III

Balanced Three Phase Systems (qualitative analysis only)**:** Generation of alternating 3- phase emf. Advantages of 3 phase over single phase power system, 3-phase balanced circuits and neutral point, derivation of voltage relations and current relations in star and delta connections.
Electrical Machines: Principles of generating and motoring.

Unit-IV

Single Phase Transformer (qualitative analysis only): Basic Principle, construction & Phasor diagram at ideal, no load and on resistive load practical conditions. Types of Losses in transformers.

Electrical Installations: Basic idea of Fuse, Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Earthing, Solid and stranded cable. Conduit. Cable trays. Basic idea regarding Electric shock and hazards, Shock protection and first aid treatment.

Reference Books:

1. Basic Electrical Engg.by S.K. Sahdev, Pearson Education (Text).
2. Electrical Engg. Fundamentals by Rajendra Prasad, PHI Pub.
3. Electrical Engg. Fundamentals: by Bobrow, Oxford Univ. Press.
4. A textbook on Power System Engg. by Chakrabarty, Soni & Gupta by Dhanpat Rai & Co. Pub.

Semester-V
Course: B.Sc.
Subject: Electronics
Paper No.: DSEE-508
Nomenclature: -DSEE1: Microprocessor Architecture and Programming with 8085

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with concept of simple as possible computer.
2. To make the students familiar with various instructions used in SAP-1 & SAP-2 Computer.
3. To acquaint the students with the design concepts of 8 bit microprocessor and working of microprocessor 8085.
4. To familiarize the students with 8085 architecture and programming.

Course Outcome: After the end of this paper, the students will be able

1. To understand the concept of SAP -1 and SAP-2 computer.
2. To understand various instructions used for low level programming.
3. To analyze given problem and write programs using 8085 assembly language.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	3

UNIT-I

Simple Idea of three state switch & three state bus ,SAP-I (Simple as Possible) Computer, Architecture, Instruction Set, Programming SAP-1, Fetch Cycle, Execution Cycle

UNIT-II

SAP-II Architecture, Instruction set of SAP –II Computer (Memory Reference instructions, Register Instructions, Jump and Call instructions, and Logic instructions) Machine Cycle and Instruction Cycle, Addressing Modes, Instruction Types.

UNIT-III

Delay Calculations, SAP-III programming Model, MOV & MVI, arithmetic instructions, increments, decrements and rotates, logic instructions, Arithmetic and logical immediates, jump instructions, extended register instructions, indirect instructions, stack instructions

UNIT-IV

Architecture of 8085 Microprocessor, Pin Description of 8085, Instruction set of 8085, Fetching and Executing Instructions, Idea of fetch execute overlap.

Reference Books:

1. Digital Computer Electronics- A P Malvino (2nd Edition)
2. Microprocessor Architecture, programming and application with the 8085 by R S Gaonkar
3. Fundamentals of Microprocessors and Microcontrollers by B.RAM

Semester-V
Course: B.Sc
Subject: Electronics
Paper No.: DSEE-508
Nomenclature: -DSEE2: Digital Signal Processing

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with concept of signals.
2. To make the students familiar with DTFT and DFT .
3. To acquaint the students with the types of digital filters.

Course Outcome: After the end of this paper, the students will be able

1. To understand the concept of signals and Z-transforms.
2. To understand various design of IIR and FIR filters.
3. To understand and compute DFT and IDFT.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

Unit- I

Elementary Discrete –time Signals, Basic operations on Sequences, Classification of Discrete-time signals, Introduction to Discrete-time Systems

Unit- II

Introduction to Z-transforms, advantages of Z-transform, relation between DTFT and Z-transform, Z-transform and ROC of finite duration sequences, properties of ROC, properties of Z-transform and Inverse Z-transform

Unit- III

Introduction to Discrete-Time Fourier Transform and its inverse, relation between DFT and Z-transform, comparison between DTFT and DFT, computation of DFT & IDFT, circular convolution, properties of DFT, Radix-2 DIT FFT

Unit- IV

Types of digital filters, design of IIR filters (approximation of derivatives, Impulse Invariant Transformation, Bilinear transformation method) design of FIR filters (using rectangular window, Hanning Window, frequency sampling technique), Structures for realization of IIR systems, Structures of realizations of FIR systems.

Reference Books:

1. A. Anand Kumar, "Digital Signal Processing", Second Edition, PHI Learning Private Limited.
2. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
3. S. Salivahanan, "Digital Signal Processing", McGraw Hill, Fourth Edition.
4. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.
5. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.

Semester-V
Course: B.Sc
Subject: Electronics
Paper No.: DSEE-509
Nomenclature:- DSEE3: Electronic Communication

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with modulation & demodulation.
2. To make the students familiar with AM, FM and pulse modulation.
3. To acquaint the students with the Digital Modulation Techniques.

Course Outcome: After the end of this paper, the students will be able

1. To understand and explain amplitude modulation & demodulation.
2. To explain frequency modulation and demodulation.
3. To understand and explain various pulse and digital modulation techniques.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT-I

Modulation & demodulation : Principle of modulation , amplitude modulation ,percent modulation ,upper & lower side frequencies ,upper & lower side bands, mathematical analysis of a modulated carrier wave, power relations in an AM wave, simple idea about different forms of amplitude modulation. A) DSB-SC B) SSB-TC C) SSBSC, amplitude modulating amplifier circuit , AM generation plate , and grid modulated system,.

UNIT-II

Frequency modulation: Frequency modulation , FM Sidebands, modulation index and number of side bands, mathematical expression for FM wave, Demodulation, diode detector for AM signals.FM detector , Limited and phase shift detectors, comparison between AM & FM.

UNIT-III

Pulse Analog Modulation: Channel capacity, Sampling theorem, PAM, PDM, PPM modulation and detection techniques, Multiplexing, TDM and FDM.
Pulse Code Modulation: Need for digital transmission, Quantizing, Uniform and Non-uniform Quantization, Quantization Noise, Companding, Coding, Decoding, Regeneration.

UNIT –IV

Digital Modulation Techniques: Block diagram of digital transmission and reception, Information capacity, Bit Rate, Baud Rate and M-ary coding. Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK) and Quadrature Phase Shift Keying (QPSK)

Reference Books:

1. Kennedy, George & Davis, Bernard / "Electronic Communication Systems" / Tata McGraw-Hill / 4thEd.
2. Modem Analog & Digital Communication Systems : B.P. Lathi; Oxford Univ. Press.
3. Communication Systems S. Haykin, John Willy & Sons.
4. Taub, Herbert & Schilling, Donald L. / "Communication Systems" / Tata McGraw-Hill
5. Electronic Communication systems: Fundamentals through Advanced (4^{th} ed.) Wayne Tomasi, Prentice Hall

Semester-V
Course: B.Sc.
Subject: Electronics
Paper No.: DSEE-509
Nomenclature:- DSEE4: Electronic Instrumentation

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with accuracy and precision.
2. To make the students familiar with lock-in-amplifier, virtual instrumentation and transducers.

Course Outcome: After the end of this paper, the students will be able

1. To understand the concept of accuracy and PLL.
2. To use the Audrino microcontroller and interfacing with lab view.
3. To use various transducers.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT-I

Accuracy and precision, Significant figures, Error and uncertainty analysis, Shielding and grounding, Electromagnetic Interference, DC measurement-ammeter, voltmeter, ohm meter, AC measurement, Digital voltmeter systems (integrating and non-integrating). Digital Multimeter: Block diagram principle of measurement of I, V, C. Accuracy and resolution of measurement.

UNIT-II

Lock-in-amplifier: Basic Principles of phase locked loop (PLL), Phase detector (XOR & edge triggered), Voltage Controlled Oscillator (Basics, varactor), lock and capture. Basic idea of PLL IC (565 or 4046). Lock-in-amplifier, Idea of techniques for sum and averaging of signals.

UNIT-III

Introduction of virtual instrumentation, Interfacing techniques (RS 232, GPIB, USB), Idea about Audrino microcontroller and interfacing software like lab View

UNIT-IV

Classification of transducers, Basic requirement/characteristics of transducers, Active and Passive transducers, Resistive (Potentiometer- Theory, temperature compensation & applications), Capacitive (variable air gap type), Inductive (LVDT) & piezoelectric transducers. Measurement of temperature (RTD, semiconductor IC sensors), Light transducers (photo resistors & photovoltaic cells).

Reference Books:

1. W.D. Cooper and A. D. Helfrick, Electronic Instrumentation and Measurement Techniques, Prentice Hall (2005).
2. E.O. Doebelin, Measurement Systems: Application and Design, McGraw Hill Book fifth Edition 2003
3. David A. Bell, Electronic Devices and Circuits, Oxford University Press (2015).
4. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Butterworth Heinmann-2008).
5. S. Rangan, G. R. Sarma and V. S. Mani, Instrumentation Devices and Systems, Tata Mcgraw Hill (1998).
6. Introduction to measurements and instrumentation, 4th Edn., Ghosh, PHI Learning

Semester-V

Paper Code: DSEE-510

Discipline Specific Elective (Electronics Practical-V)

Programme	Course Credit	Practical Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	4	10	40	50	3 Hours

Course Objectives

The objective of teaching this practical paper is

1. To be familiar with computational tools like MATLAB etc.
2. To Analyze and interpret experimental data.
3. To understand and write program using 8085 assembly language.

Course Outcome

After the end of this paper, the students will be able

1. To use computational tools like MATLAB etc.
2. To analyze given problem and write programs using 8085 assembly language.
3. To present the experimental results and conclusions in the form of written report in clear and concise manner.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	2	3	3	3	2

Note: A candidate is required to perform minimum 6 experiments out of the list provided during course of study in this semester.

1. (a) Addition of Two 16 Bit Numbers (b) Subtraction of two 16 Bit numbers on Microprocessor-Kit.
2. Multibyte Addition/Subtraction of two numbers by repetitive addition/subtraction on Microprocessor-kit.
3. Division of two 8-Bit numbers by repetitive subtraction on microprocessor-Kit.
4. Multiplication of Two 8-Bit Numbers on Microprocessor –Kit.
5. Find the smallest/largest number from a give series of numbers on Microprocessor-Kit.
6. To sort a given series of unsigned numbers in Ascending/ descending order on Microprocessor-kit.
7. Check even parity/add parity of binary number on microprocessor-Kit.
8. Generation & plot of unit sample sequence, unit step, ramp function, discrete time sinusoidal sequence over given intervals (MATLAB).
9. Given x[n], write program to find X[z] (MATLAB).
10. Discrete Fourier Transform and its properties (MATLAB).
11. Fast Fourier Transform and its properties (MATLAB).
12. Design of a digital IIR Butterworth filter for low pass and high pass (MATLAB).
13. Design of digital FIR filters using windows (MATLAB).

Semester-VI

Course: B.Sc
Subject: Electronics
Paper No.: DSEE-608
Nomenclature:- DSEE5: Interfacing Peripheral Devices and Applications of 8085

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with the concept of interrupts.
2. To make the students familiar with interfacing technique using PPI 8255 and Programmable Interval Timer 8253.
3. To acquaint the students with the design concept DMA.

Course Outcome: After the end of this paper, the students will be able

1. To understand the use of interrupts used in microprocessor 8085.
2. To understand the interfacing of IC 8255 as well as interfacing & programming of 8253.
3. To analyze given problem and write programs using 8085 assembly language.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT-I

Interrupt: Methods of Input/output operations, Data transfer Schemes, software Interrupts, Hardware interrupts, Interrupt control circuits, Interrupt instructions.

UNIT-II

Programmable Peripheral Interface 8255: operational modes of 8255, control word format for 8255, programming in Mode 0, programming in Mode 1, programming in Mode 2, BSR mode.

UNIT-III

Programmable Interval Timer 8253: Block diagram of 8253, control word format for 8253, Interfacing & programming of 8253, Programming of 8253 in various modes.

UNIT-IV

Direct Memory Access Controller 8257: Block diagram, Programming of 8257, Applications to illustrate the use of Microprocessor in:

1. Traffic light
2. Temperature control
3. Stepper Motor control
4. Washing machine control.

Reference Books:

1. Digital Computer Electronics- A P Malvino (2nd Edition)
2. Microprocessor Architecture, programming and application with the 8085 by R S Gaonkar
3. Fundamentals of Microprocessors and Microcontrollers by B.RAM

Semester-VI
Course: B.Sc
Subject: Electronics
Paper No.: DSEE-608
Nomenclature:- DSEE6: Verilog and FPGA based System Design

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with designing of combinational & Sequential circuit using HDL.
2. To make the students familiar with designing of programmable logic devices using FPGA based system.
3. To acquaint the students with the concepts of Verilog.

Course Outcome: After the end of this paper, the students will be able

1. To understand the design of various circuits using HDL.
2. To understand the concept of digital circuit design and basics of Verilog HDL.
3. To understand programmable logic devices using FPGA.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT-I

Digital logic design flow , Review of combinational circuits , Combinational building blocks: multiplexors, demultiplexers , decoders, encoders and adder circuits. Review of sequential circuit elements: flip-flop, latch and register.

UNIT-II

Finite state machines: Mealy and Moore. Other sequential circuits: shift registers and counters. FSMD (Finite State Machine with Datapath) : design and analysis. Microprogrammed control. Memory basics and timing. Programmable Logic devices

UNIT-III

Evolution of Programmable logic devices : PAL, PLA and GAL. CPLD and FPGA Architectures, Placement and routing, Logic cell structure, Programmable interconnects, Logic blocks and I/O Ports , Clock distribution in FPGA. Timing issues in FPGA design. Boundary scan.

UNIT-IV

Verilog HDL: Introduction to HDL , Verilog primitive operators and structural Verilog Behavioral Verilog, Design verification. Modeling of combinational and sequential circuits (including FSM and FSMD) with Verilog Design examples in Verilog.

Reference Books:

1. LizyKurien and Charles Roth. *Principles of Digital Systems Design and VHDL.*Cengage Publishing. ISBN-13: 978-8131505748
2. Palnitkar, Samir, *Verilog HDL.* Pearson Education; Second edition (2003).
3. Ming-Bo Lin. *Digital System Designs and Practices: Using Verilog HDL and FPGAs.* Wiley India Pvt Ltd. ISBN-13: 978-8126536948
4. Zainalabedin Navabi. *Verilog Digital System Design.* TMH; 2ndedition. ISBN-13: 978-0070252219
5. Wayne Wolf. *FPGA Based System Design.* Pearson Education.
6. S. K. Mitra, Digital Signal processing, McGraw Hill, 1998
7. VLSI design, Debaprasad Das, 2nd Edition, 2015, Oxford University Press.

Semester-VI
Course: B.Sc
Subject: Electronics
Paper No.: DSEE-609
Nomenclature:- DSEE7: Introduction to C and its programming

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with high level programming language C.
2. To make the students familiar with entering input data , writing output data, functions, concept of arrays and pointers in C language.

Course Outcome: After the end of this paper, the students will be able

1. To understand the C fundamentals.
2. To understand various data types used for programming and will be able to write programs.
3. To analyze given problem and write programs using high level programming language C.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT-I

C. Fundamentals: The character set, identifiers & keywords, data types, constants, variables& arrays declaration, expressions statements, symbolic constants. Operators and expressions: Arithmetic operators, uniary operators, relational and logical operators, assignment operators, conditional operators.

UNIT-II

Data input and output: Entering input data- The scanned function, Writing output data- The print function. Control statements: While statement, Do-while statement, for statement, If-else statement, switch statement, break statement, continue statement.

UNIT-III

Function: Defining a Function, Accessing a Function, passing arguments to a Function, specify arguments, data types.

UNIT-IV

Arrays: Defining an Array, processing an Array, Passing arrays to a function, Multidimensional arrays, arrays and strings. Pointers: Fundamentals, pointer declaration, passing pointers to a function, pointers and one dimensional array, operations on pointers.

Reference Books:

1. Schaum's Outline series: Theory and problems of programming with C by Byron
2. Let Us C by Yashavant Kanetkar

Semester-VI
Course: B.Sc
Subject: Electronics
Paper No.: DSEE-609
Nomenclature:- DSEE8: MODERN COMMUNICATION SYSTEMS

Programme	Course Credit	Theory Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	2	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with the concept of antenna.
2. To make the students familiar with wireless communication and Cellular System Fundamentals.
3. To acquaint the students with 2G, 3G, 4G and 5G networks.

Course Outcome: After the end of this paper, the students will be able

1. To understand the use of antenna and its parameters.
2. To understand the wireless communication systems, wireless networks and cellular system.
3. To understand the different internet generations.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	--	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	--	3	3	3	2

UNIT-I

Antenna & its Parameters: Antenna as an element of wireless communication system, Types of Antennas, Antenna parameters: Radiation pattern (polarization patterns, Field and Phase patterns), Field regions around antenna, Radiation intensity, Beam width, Gain, Directivity, Polarization, Bandwidth, Efficiency and Antenna temperature.

UNIT-II

Wireless communication Systems: History of wireless communication, Wireless Generation and Standards, Cellular and Wireless Systems, Current Wireless Systems, Cellular Telephone Systems, Wide Area Wireless Data Services, Broadband Wireless Access, Satellite Networks, Examples of Wireless Communication Systems.

UNIT-III

Wireless Networks: Second Generation (2G) Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL), Wireless Local Area Networks (WLANs), Bluetooth and Personal Area Networks (PANs). Idea about Wi-Fi, 4G and LTE, 5G

UNIT-IV

Cellular System: Cellular Concept and Cellular System Fundamentals, Frequency Reuse, Channel Assignment Strategies, Handoff strategies, Interference and System Capacity, Trunking and Grade of Service. Improving Coverage & Capacity in Cellular Systems, Cell Splitting and Sectoring, Cellular Systems design Considerations (Qualitative idea only).

Reference Books:

1. Ballanis, Antenna Theory, John Wiley & Sons, (2003) 2nd Ed.
2. Jordan and Balmain, E. C., Electro Magnetic Waves and Radiating Systems, PHI, 1968 Reprint (2003) 3rd Ed.
3. Andrea Goldsmith, Wirelerss communications, (2015) Cambridge University Press
4. D. Tse and P. Viswanathan, Fundamentals of Wireless Communication, (2014) Cambridge University Press.
5. Wireless communication and Networks, Upena Dala, 2015, Oxford University Press.
6. Antenna and Wave Propagation, Yadava, PHI Learning.
7. Haykin S. & Moher M., Modern Wireless Communication, Pearson, (2005) 3rd Ed.

Semester-VI

Paper Code: DSEE-610

Discipline Specific Elective (Electronics Practical-VI)

Programme	Course Credit	Practical Hours per week	Internal Assessment Marks	External Examination Marks	Maximum Marks	End Term Examination Time
B.Sc.	2	4	10	40	50	3 Hours

Course Objective: The objectives of teaching this paper are

1. To make the student familiar with high level programming language C.
2. To understand the implementation of basic circuits in VHDL.
3. To understand the applications of microprocessor 8085.

Course Outcome: After the end of this paper, the students will be able

1. To analyze given problem and write programs using high level programming language C.
2. To perform experiments related to FPGA
3. To use how to analyze, interpret and present the results of experiments.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO2	3	3	2	3	3	3	3	--	--	2	3	3	3	2
CO3	3	3	2	3	3	3	3	--	--	2	3	3	3	2

Note: A candidate is required to perform minimum 6 experiments out of the list provided during course of study in this semester.

1. Computer Programming in C using if, else, for, while statements.

2. Computer Programming in C using arrays and pointers.

3. Write a C program to reverse the array (the array must be taken as input).

4. Generate a time delay through software on Microprocessor-Kit.

5. Write a C program to swap two numbers using pointers.

6. Program to generate Square and triangular waves using Microprocessor-Kit.

7. Program to generate Sine wave using Microprocessor-Kit.

8. Programming of arithmatic combinational circuits using verilog and realization of their truth table.

9. Programming of multiplexer and demultiplexer circuits using verilog and realization of their truth table.

10. Programming of various flip-flops using verilog and realization of their truth table.

11. Programming of counters using verilog and realization of their truth table.

Kurukshetra University, Kurukshetra
(Established by the State Legislature Act XII of 1956)
('A+' Grade, NAAC Accredited)

॥ योगस्थः कुरु कर्माणि ॥
समबुद्धि व योगयुक्त होकर कर्म करो
(Perform Actions while Stead fasting in the State of Yoga)

Scheme of Examination and Syllabus of Bachelor of Science (B.Sc.) Programme (Course: Electronic Equipment Maintenance) (CBCS)
in Phased Manner

DEPARTMENT OF ELECTRONIC SCIENCE

CBCS CURRICULUM (2020-21)

Program Name: Bachelor of Science (B.Sc.) Programme
(**Course: Electronic Equipment Maintenance**)
(CBCS)

(For the Batches Admitted From 2020-2021)

Programme Outcomes (POs) for Three Year B.Sc. Programme (Course: Electronic Equipment Maintenance)

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study.
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large.
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems.
PO4	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
PO5	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PO6	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices.
PO7	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices.
PO8	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout the life.
PO9	Environment and Sustainability	Ability to design and develop modern systems which are environmentally sensitive and to understand the importance of sustainable development.
PO10	Ethics	Apply ethical principles and professional responsibilities in scientific practices.
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects.

Programme Specific Outcomes (PSOs) for Three Year B.Sc. Programme (Course: Electronic Equipment Maintenance)

PSO1	Students will be able to acquire the techniques & skills for the basic understanding of the principles and working of various Electronic Equipment and their repair & maintenance.
PSO2	Ability to explore technical knowledge in diverse areas of Electronics and experience an environmentin cultivating the skills for a successful career in repair & maintenance of any Equipment, entrepreneurship as also the higher studies.
PSO3	Ability to design & perform electronic experiments as well as to analyze & suggest effective solutions.

SCHEME OF EXAMINATION AND SYLLABI
for
B.Sc. Programme (Course: ELECTRONIC EQUIPMENT & MAINTENANCE)
under
Choice Based Credit System (CBCS) w.e.f. 2020-21in Phased Manner

Sem-ester	Course	Paper Code	Nomenclature	Credits	Workload /Hrs/week	Exam. Duration (Hrs)	Internal Marks	External Marks	Total Marks
							Max.	Max.	
1	CC-EEM -1	EEM-101	Principles of Electronics-I	3	3	3	15	60	75
		EEM-102	Electronic Devices, Components and Assemblies-I	3	3	3	15	60	75
		EEM -103	Practical-I	2	4	3	-	50	50
	TOTAL			**08**	**10**	**-**	**30**	**170**	**200**
2	CC-EEM -2	EEM -201	Principles of Electronics-II	3	3	3	15	60	75
		EEM -202	Electronic Devices, Components and Assemblies-II	3	3	3	15	60	75
		EEM -203	Practical-II	2	4	3	-	50	50
	TOTAL			**08**	**10**	**-**	**30**	**170**	**200**
3	CC-EEM -3	EEM -301	Operational Principles of Audio and Video Systems	3	3	3	15	60	75
		EEM -302	Microprocessor 8085 & Interfacing	3	3	3	15	60	75
		EEM - 303	Practical-I	2	4	3	-	50	50
	TOTAL			**08**	**10**	**-**	**30**	**170**	**200**
4	CC-EEM -4	EEM -401	Advanced Digital Electronics	3	3	3	15	60	75
		EEM -402	8051 : Programming & Applications	3	3	3	15	60	75
		EEM -403	Practical-II	2	4	3	-	50	50
	TOTAL			**08**	**10**	**-**	**30**	**170**	**200**
5	**DSE-EEM-5	DSE-EEM-501 (ELECTIVE-I)	Electronic Instrumentation	2	2	3	10	40	50
			Computer Hardware & Maintenance-I						
		DSE-EEM-502	Consumer Electronics	2	2	3	10	40	50
			Transducers and Sensors						
		EEM-503	Skill Development MOOC/SWAYAM Course	2	2	3	-	50	50
		EEM-504	Major Project	2	4	3	-	50	50
	TOTAL			**08**	**10**	**-**	**20**	**180**	**200**
6	**DSE-EEM -6	DSE-EEM-601 (ELECTIVE-II)	Electronic Equip. Maintenance	2	2	3	10	40	50
			Computer Hardware & Maintenance-II						
		DSE-EEM -602	Biomedical Equip. Maintenance	2	2	3	10	40	50
			Embedded Systems & Robotics						

		EEM -604	Practical	2	4	3	-	50	50
	TOTAL			**06**	**08**	**-**	**20**	**130**	**150**
TOTAL CREDITS/MARKS				**46**	**58**	**-**	**160**	**990**	**1150**

**** DSE (Discipline Specific Elective).**

Important Instructions:-

1. A student can opt for one paper out of the list of elective papers provided against each paper code for respective semester.
2. One credit equivalent to 1 hour of teaching/2 hours of Practical work.
3. One credit equivalent to 25 marks.
4. Teaching workload will be calculated on the basis of teaching contact hours of the course.
5. The Practical examination will be held at the end of odd and even semester in one session of three hours duration.
6. For Practical/Project work, a maximum of 15 students are allowed in one group during course of study and also in Examination.
7. During Practical Examination, a candidate is required to perform one experiment from the prescribed list of experiments.
8. Distribution of Marks in Practical Examination B.Sc. I, II, III, IV& VI Semester):

I. Internal Marks: 10

II. Experiment Performed: 15

II. Lab Record: 10

IV. Viva/Voce : 15

9. Distribution of Marks in Major Project (Paper EEM-504) of B.Sc. V Semester:

I. Internal Marks: 10

II. Project Developed: 15

II. Project Report: 10

III. Viva Voce: 15

Course Code: CC-EEM -1 Paper Code: EEM-101	Course Name: PRINCIPLES OF ELECTRONICS – I
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: The aim of this course is to familiarize with fundamental concepts of digital electronics and designing of logic circuits.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Familiarize with the different number systems, basic concepts and laws of Boolean algebra.
CO2	Understand the fundamental concepts of logic gates, logic families and the abilities of reducing the Boolean expressions.
CO3	Learn minimization techniques in simplifying the hardware requirements of digital circuits.
CO4	Understand the concepts of combinational and sequential circuits utilized in the different digital circuits and systems.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	3	2	2	2	2	3	2
CO2	3	2	3	3	3	2	2	2	2	2	2
CO3	3	3	2	3	3	2	2	2	2	3	2
CO4	3	2	3	3	3	2	2	2	2	2	2

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2
CO2	2	3	3
CO3	3	3	2
CO4	2	3	3

Unit-I

Number Systems: Introduction to Decimal, Binary, Octal, Hexadecimal NumberSystems and their inter-conversions; BCD codes, Excess-3 codes, Gray codes, Cyclic codes, code conversions; BCD Arithmetic, parity, binary arithmetic (addition, Subtraction, multiplication, division), 1's and 2's compliments and 9's and 10's compliments.

Unit-II

Boolean Algebra: Postulates & theorems of Boolean algebra, Duality Principal, De-Morgan's Theorem.**Logic Gates:** Positive and Negative Logic, Basic Logic Gates: AND, OR, NOT (symbol, truth-table, circuit diagram, working); NAND, NOR, EX-OR, EX-NOR (symbol, truth table).

Minimization Techniques: Reduction of Boolean expressions using Boolean Identities, SOP and POS form of Boolean functions,Karnaugh Map simplifications, implementations of SOP and POS form using NAND and NOR gates.

Unit-III

Digital Logic Families: Characteristics (fan in, fan out, noise margin, propagation delay, power dissipation), Bipolar and unipolar logic families and their comparison, Characteristics of digital ICs, Resistor Transistor logic (RTL), Diode Transistor logic (DTL), High Threshold Logic (HTL), Transistor Transistor logic (TTL), Schottky TTL, MOS & CMOS, Emitter Coupled Logic (ECL).

Unit-IV

Combinational circuits: Half adder, Full adder, Half Subtractor, Full Subtractor, 8421 adders, Parallel Binary Adder, 1's & 2's complementAdder/Subtractor, Excess-3 adder, Digital Comparator, Multiplexer, Demultiplexer.

Basic Sequential circuit: Asynchronous and Synchronous circuits, Flip-Flops (RS, JK, MS-JK, D and T-type), Shift Register, Applications of shift register: Ring counter, Time delay,Sequence Generator.

References:

1. Digital Electronics by R.P. Jain
2. Digital Computer Electronics by A. P. Malvino

Course Code: CC-EEM-1	Course Name: ELECTRONIC DEVICES, COMPONENTS AND ASSEMBLIES - I
Paper Code: EEM-102	
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: The aim of this course is to familiarize with fundamental concepts of basic electronic devices and circuits.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Familiarize with the concepts of various passive & active components and their characteristics.
CO2	Understand the working principles of various electronics circuits.
CO3	Understand the mechanism and basic principle of working of popular measuring instruments.
CO4	Understand the mechanism of various electronic devices and measuring instruments and equip the design of analog circuits based on these electronic devices.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	3	2	2	2	2	3	2
CO2	3	2	3	3	3	2	2	2	2	2	2
CO3	2	3	3	3	2	2	2	2	1	1	1
CO4	3	2	2	2	3	3	3	3	3	2	2

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2
CO2	2	3	3
CO3	3	3	3
CO4	2	2	2

Unit-I

Passive Components: Resistors, Capacitors, Inductors, Transformers, Relays, Fuses(their types & applications).

Introduction to Semiconductors: Energy Band Diagram, Conductors, Semiconductors,Insulators, Intrinsic and Extrinsic Semiconductors (P&N), currents in semiconductors, Diffusion Junction, Depletion Layer, Barrier Potential.

Junction Diodes: Rectifying diode, Forward and reverse bias characteristics, ZenerDiodes, Varactor Diode, Light Emitting Diode, Photodiode and Phototransistors (qualitative only).

Unit-II

Rectifiers: Half wave, Full wave, Bridge (calculation of ripple factor and rectificationefficiency), Filters (L, C, LC, π), Clipping and Clamping circuits.

Zener diode regulator: circuit diagram and explanation for load and line regulation, disadvantages of Zener diode regulator.

Bipolar Junction Transistor: Basic working principle, Input and Output Characteristicsof CB & CE configurations, Biasing, Operating point, Load line, thermal runaway, stability and stability factor, Stabilization of Operating Point, Collector to Base bias, Voltage Divider bias and Emitter bias (+VCC &–VEE bias), circuit diagrams and their working.

Unit-III

Amplifiers: Classification of amplifiers, Class-A, B, AB and C Amplifiers, Cascading ofAmplifiers, RC Coupled amplifiers. Properties of amplifiers (distortion, noise, thermal noise, shot noise, noise figure). Feedback in Amplifiers: Feedback concept, transfer gain with feedback, Effect of Negative Feedback on amplifiers performance.Transistor as a switch (circuit and working), Darlington pair and its applications.

Unit-IV

Field Effect Transistors: JFET, basic working principle, I/O Characteristics, pinch offVoltage, parameters, MOSFET, basic working principle, Characteristics.

Measuring Instruments: Regulated power supply, Analogue Multimeter, DigitalMultimeter, Cathode Ray Oscilloscope, Function Generator (functional block diagram, basic working principle, measuring quantities).

References:

1. Basic Electronics and Linear Circuits by Bhargava & Kulshreshtha (TTTI)
2. Integrated Electronics by Millman and Halkias

Course Code: CC-EEM -1	Course Name: PRACTICAL - I	
Paper Code: EEM-103		
Type: Core Course (CC);	**Course Credits:** 02;	**Contact Hours:** 04 hours/week;
Examination Duration: 3 Hours;	**Mode:** Lab. Work	
External Maximum Marks: 40;	**Internal Maximum Marks:** 10	

Course Objectives: The aim of this course is to learn the practical aspects of Theory Papers.

List of Experiments: (Minimum 6 experiments are to be performed in a semester)

Basic Analog & Digital Electronics - I

1. Practical use of:
   (a) Multimeter (measurement of voltage, current, resistance).
   (b) Oscilloscope (voltage and frequency measurement).
2. Study of Electronic Components:
   (a) Resistor (study the types, colour coding, potential divider arrangement).
   (b) Capacitors (study the types).
3. P-N Junction Diode (study V-I Characteristics).
4. Study of PN diode as wave clipping element.
5. Study of Zener Diode as a voltage regulator.
6. Study of Transistors (manual study, CB/CE/CC Characteristics, parameters).
7. Familiarization with Breadboard, IC types, pin number, testing, IC Manual.
8. Verification of truth tables for two input AND, OR, NOT gates.
9. Design DTL & TTL NAND Gate using discrete components & verify its truth table.
10. Study of Half Adder and Full Adder.
11. Study of 4:1 multiplexer.
12. Study of JK, D, T type flip-flops.

Course Code: CC-EEM -2 Paper Code: EEM-201	Course Name: PRINCIPLES OF ELECTRONICS – II
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR morequestions selecting ONE question from each UNIT. All questions will carryequal marks.

Course Objectives: The aim of this course is to familiarize with networks and their analysis.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Understand the basic concepts on RLC circuits and their steady states and transients behaviour.
CO2	Learn the concepts of circuit analysis on the basis of KCL and KVL.
CO3	Gain the knowledge in analyzing networks on the basis of various network theorems in real world applications.
CO4	Understand the concepts of various parameters of a two-port network and their interconversions.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	3	2	2	2	2	1	2
CO2	3	2	3	3	1	2	2	3	2	2	2
CO3	2	3	3	3	2	2	3	2	1	1	2
CO4	3	2	2	2	3	3	2	3	3	2	3

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	2
CO2	2	2	2
CO3	2	3	3
CO4	2	3	3

Unit-I

DC Transient Analysis: RC Circuit- Charging and discharging with initial charge, RL Circuit with Initial Current, Time Constant, RL and RC Circuits with sources, DC Response of Series RLC Circuits.
Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor.
Sinusoidal Circuit Analysis: for RL, RC and RLC Circuits, Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth.
Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

Unit-II

Circuit Analysis: Source Transformation, Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis, Star-Delta Conversion.

Unit-III

Network Theorems: Principle of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem.

Unit-IV

Two Port Networks: Impedance Parameters, Admittance Parameters, HybridParameters, Inverse Hybrid Parameters, Transmission Parameters, Inverse Transmission Parameters, Transformation of parameters.

References:

1. Networks and Systems by D. Roy Choudhary
2. Network Analysis , Publication Pearson India By M.E. Van Valkenburg
3. Circuits and Networks by A. Sudhakar and Shyam Mohan

Course Code: CC-EEM -2	Course Name:ELECTRONIC DEVICES, COMPONENTS AND ASSEMBLIES - II
Paper Code: EEM- 202	
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: The aim of this course is to learn the operation of power devices & linear integrated circuits and their applications.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Understand the working principle of various power devices and their applications.
CO2	Know the technicalities of operational amplifiers and their applications in designing various circuits.
CO3	Know the technicalities of IC Regulators and their applications as voltage regulators.
CO4	Understand the design concepts of oscillators, multivibrators and active filters.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	3	2	2	2	2	1	2
CO2	3	2	3	3	1	2	2	3	2	2	2
CO3	2	3	3	3	2	2	3	2	1	1	2
CO4	3	2	2	2	3	3	2	3	3	2	3

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2
CO2	2	3	3
CO3	3	3	3
CO4	2	2	2

Unit-I

Power Control Devices: Four Layer Diode (PNPN), Silicon Controlled Rectifier (SCR), Triac, Diac (Principle, Characteristics and Applications).
Unijunction Transistor: Basic Working Principle, Characteristics, intrinsic standoff ratio, Applications as aswitch and as time base generator.

Unit-II

Operational Amplifiers: Basic idea of an OPAMP with black box concept, emittercoupled differential amplifier, transfer characteristics of a differential amplifier, IC 741 various parameters, offset error voltages and currents, temperature drift of input offset voltage and current, inverting and non-inverting amplifiers, virtual ground, summing, difference, integrator, differentiator.

Unit-III

Power Supplies: Regulated power supply, transistorizedseries and shunt regulated power supply, block diagram of IC 723, regulated supply using IC 723, three terminal regulator ICs, IC based power supply study.

Unit-IV

Oscillators: Positive Feedback, Barkhausen criteria, Phase-Shift Oscillators, WeinBridge Oscillators, Hartley's and Colpitt's Oscillators, Crystal Oscillators.
Timer IC 555: Block diagram and operation, applications as Monostable & Astable Multivibrators.
Active Filters: Ist order low pass, high pass and Band pass Butterworth filters

References:

1. Integrated Electronics by Millman and Halkias
2. Op-Amp and Linear Integrated Circuits by R. A. Gyakward

Course Code: CC-EEM -2	Course Name: PRACTICAL - II	
Paper Code: EEM-203		
Type: Core Course (CC);	**Course Credits:** 02;	**Contact Hours:** 04 hours/week;
Examination Duration: 3 Hours;	**Mode:** Lab. Work	
External Maximum Marks: 40;	**Internal Maximum Marks:** 10	

Course Objectives: The aim of this course is to learn the practical aspects of Theory Papers.

List of Experiments: (Minimum 6 experiments are to be performed in a semester)

Basic Analog & Digital Electronics - II

1. To study RC low pass and high pass filter and measurement of cut-off frequency from graph.
2. To study RC components as integrating and differentiating circuits.
3. Study of Superposition Theorem (Verification and Application).
4. Study of Maximum Power Transfer Theorem for DC network (Verification).
5. Design power controller using SCR/Diac/Triac.
6. Study UJT characteristic and design UJT as relaxation Oscillator and calculate its frequency of oscillation.
7. Measurement of offset voltage, bias currents & CMRR of an operational amplifier.
8. Operational amplifier as (1) units gain buffer (I) inverting amplifier (3) Non-inverting amplifier.
9. Operational amplifier as (1) summing amplifier (2) difference amplifier.
10. Investigate the use of an op-amp as an Integrator and Differentiator.
11. Design and testing of oscillators (any two):
    (a) RC-phase shift (b) Wein Bridge (c) Hartley (d) Colpitt
11. Study of Monostable and Astable multivibrator using IC 555.
12. Study the frequency response of 1st and 2nd order active High pass/Low pass filter.

Course Code: CC-EEM -3	Course Name: OPERATIONAL PRINCIPLES & AUDIO AND VIDEO SYSTEMS
Paper Code: EEM- 301	
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: To understand working mechanism of various types of Audio-Video Equipment.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Familiarize with the superheterodyne receiver and its different sections.
CO2	Understand the fundamental concepts of audio systems and their recording mechanisms.
CO3	Learn working mechanism of a TV Receiver and its various sections.
CO4	Learn the technicalities of common audio & video equipment.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	3	2	2	2	2	3	2
CO2	3	2	3	3	3	2	2	2	2	2	2
CO3	2	3	3	3	2	2	2	2	1	1	2
CO4	3	2	2	2	3	3	2	3	3	2	2

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3
CO2	2	3	3
CO3	2	3	3
CO4	2	2	3

Unit-I

Superheterodyne Receivers: Principles, advantages, block diagram, RF input and coupling AF coupling arrangements, RF amplifiers, mixer, local oscillator, IF amplifier, detector, audio amplifier, loud speaker, power requirements.

High Fidelity & Stereophony: High Fidelity, Stereophony and Monophony (difference), Ideal & Practical Stereo System, Quadraphonic sound system, stereophonic recording on Disc and Reproduction, block diagram of stereo recording on disc, Hi-Fi stereo reproducing system, Stereo Controls, Troubleshooting of Stereo Amplifier.

Unit-II

Television Receiver: schematic block diagram and functions of different sections, Analysis of TV Picture:Gross structure, Image continuity, number of scanning lines, flicker, fine structure.

CompositeVideoSignal: Video Signal dimensions, Horizontal& Vertical synchronous details, vestigial sidebandtransmission.

Video Detector: video signal detection (Basic idea), basic video detector, video detector requirements.

Unit-III

Video Section Fundamentals: Video amplifiers, Transistor video amplifier, contrast control methods, Direct coupled video amplifier, Advantages of AGC, various AGC systems, merits of keyed AGC system.

Unit-IV

Deflection Oscillators: Deflection current waveform, generation of driving voltage waveform, Requirements of vertical deflection stage (in brief).

Sound System: Sound signal separation, sound take off circuits, audio O/P state.

RF Tuner: Tuner operation and its functions, various sections of VHF tuner.

Video IF Amplifier: Video IF Section, IF amplifier, Adjacent channel interference.

References:

1. Radio Engineering by G.K.Mithal
2. Monochrome TV and Colour TV by R.R.Gulati.
3. Principles of communication by GeorgeKennedy
4. Basic Radio and Television by S.P.Sharma.

Course Code: CC-EEM -3	Course Name: MICROPROCESSOR 8085 & INTERFACING

Paper Code: EEM- 302	
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: The aim of this course is to introduce with 8085 microprocessor and its programming concepts.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Familiarize with 8085 microprocessor architecture, instruction sets, addressing modes.
CO2	To learn programming techniques in 8085 microprocessor.
CO3	Understand the stacks and stack operations in 8085.
CO4	Understand the fundamental concepts of interfacing of 8085 microprocessor with input/output and memory devices.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	2	3	2	3	2	2	3	2	2	2
CO2	3	2	3	2	2	3	2	3	2	1	3
CO3	3	2	3	2	2	2	2	3	2	2	2
CO4	3	2	3	2	3	3	2	3	3	2	3

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2
CO2	3	3	3
CO3	2	3	2
CO4	3	3	3

Unit-I

Microprocessor Architecture: Microprocessor Architecture and its Operations, Fetching, decoding and execution of an Instruction, concept of Peripheral I/O and Memory Mapped I/O.

Instruction Set of 8085: 8085 Programming Model, Instruction Classification, Instruction and Data Format, Addressing Modes. Data Transfer Operations, Arithmetic Operations, Logic Operations, BranchOperations.

Unit-II

Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-bit Arithmetic Instructions, Arithmetic Operation related to Memory, Logic Operations: Rotate, Compare, Counters and Time Delays with few examples.

Stacks and Subroutines: Stack, Subroutine, Restart, conditional call, and return instructions; BCD Addition, BCD Subtraction, Introduction to advanced instructions and applications, multiplication, subtraction with carry.

Unit-III

Interrupts & Interfacing Data Converters: 8085 Interrupt, 8085 Vectored Interrupts, Direct Memory Access, Digital-to-Analog Converter (basic concepts, D/A Converter Circuits, Interfacing 8-bit D/A Converter), Analog-to-Digital Converter (basic concepts, Successive Approximation A/D Converter, Interfacing 8-bit A/D Converter).

Unit-IV

Programmable Interface Devices: 8155 Multipurpose Programmable Device (I/O ports & Timer, Interfacing 7-segment-LED), 8255 programmable peripheral interface (block diagram, modes), 8253/8254 Programmable Interval Timer (block diagram, programming 8254), 8259 Programmable Interrupt Controller (block diagram, interrupt operation and features).

References:

1. Microprocessor Architecture, Programming & Applications with 8085 by R. S.Gaonkar.
2. Introduction to Microprocessors by A.P.Mathur.

Course Code: CC-EEM -3	Course Name: PRACTICAL - I	
Paper Code: EEM-303		
Type: Core Course (CC);	**Course Credits:** 02;	**Contact Hours:** 04 hours/week;
Examination Duration: 3 Hours;	**Mode:** Lab. Work	
External Maximum Marks: 40;	**Internal Maximum Marks:** 10	

Course Objectives: The aim of this course is to learn the practical aspects of Theory Papers.

List of Experiments: Minimum 6 experiments are to be performed in a Semesters.

Audio/Video Systems &Advanced Digital Electronics

1. Study of Radio Receiver testing (noting waveforms and voltages at different check points, fault finding and troubleshooting).
2. To identify various sections of a TV Receiver; to understand basic working of TV receiver and the main functions of various sections.
3. Location, Orientation and Connection of TV antenna; main faults of antenna and their rectification; knowledge of Balun unit and its replacement.
4. Study of Power supply cold tests and hot tests, voltage measurement at various points and the common faults in power supply.
5. Study of IF section testing by voltage measurement.
6. Study of Horizontal and vertical section testing.
7. Study of Audio section testing by voltage measurement.
8. Study of common faults and their rectification in a TV receiver.
9. To design the circuit of Schmitt Trigger using Op-amp IC 741 and plot its voltage waveforms.
10. To design and study the Sample and Hold Circuit.
11. To design Digital to Analog (D/A) Converter by binary weighted resistors & R-2R ladder arrangement.
12. Design an 8-bit Analog to Digital (A/D) Converter that utilizes LEDs to indicate its binary output value.

Course Code: CC-EEM -4	Course Name: ADVANCED DIGITAL ELECTRONICS
Paper Code: EEM- 401	
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: The aim of this course is to familiarize with some advanced concepts of digital electronics.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Familiarize with advanced combinational & sequential circuits, viz., code converters, and counters.
CO2	Understand the application aspect of timing circuits to generate various types of timing pulses/waveforms implemented in digital circuits.
CO3	Learn the structure of various types of memories, importance of PLA and familiarization with various types of A/D and D/A converters and their features.
CO4	Learn the minimization techniques in simplifying the hardware requirements of digital circuits for their role in digital system design.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	3	2	2	2	2	-	2
CO2	3	2	3	3	3	2	2	2	2	-	2
CO3	2	3	3	3	2	2	2	2	2	1	2
CO4	3	3	2	2	3	3	2	3	2	-	2

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2
CO2	2	3	3
CO3	2	3	3
CO4	2	2	2

Unit-I

Code Converters: Encoders and Decoders, Design of Code Converters: BCD to SevenSegment, BCD to Cyclic Code, Binary to Decimal, Binary to Gray, Binary to Excess-3.
Counters: Asynchronous Binary Counters, Asynchronous Mod-N Counter, Synchronous counter: Design principle of Modulo- NCounters, UP-Down counters, Decade Counter, BCD Counter.

Unit-II

Timing Circuits: Applications of Logic Gates in Timing Circuits, OPAMP and its applications in Timing Circuits (OPAMP Comparator, Regenerator Comparator, Schmitt Trigger, Free Running Multivibrator, Monostable Multivibrator), Schmitt Trigger Square Wave Generator.

Unit-III

Memories: Memory Organization and Operation, Expanding Memory Size, Classification and Characteristics of Memories, Sequential Memory (Static Shift Register, Dynamic Shift Register, Dynamic MOS Inverter), Read Only Memory (ROM Organization, Programming Mechanisms, , Read and Write Memory (Bipolar RAM Cell, MOS RAMs, Charge Couple Device Memory (Basic concept of CCD, Operation of CCD)

Unit-IV

Programmable Logic Array: Input Buffer, AND Matrix, OR Matrix, Invert/Non-Invert Matrix, Output Buffer, Output Through FFs and Buffers, Programming PLA, Expanding Capacity, Applications of PLA
A/D and D/A Converters: D/A Converters (Specifications, Weighted Resister, R-2R Ladder), Sample and Hold Circuit, A/D Converters (Quantization and Encoding, Specifications, Parallel Comparator, Successive Approximation, Dual Slope)

References:

1. Modern Digital Electronics by R. P. Jain
2. Integrated Electronics by Millman & Halkias
3. Digital Computer Electronics by A. P. Malvino

Course Code: CC-EEM -4 Paper Code: EEM- 402	Course Name: 8051: PROGRAMMING & APPLICATIONS
Type: Core Course (CC) **Course Credits:** 03 **Contact Hours:** 03 hours/week. **Examination Duration:** 3 Hours **Mode:** Lecture **External Maximum Marks:** 60 **Internal Maximum Marks:** 15	**Instructions For Paper Setter:** Examiner will be required to set NINE questions in all. Question No.1 will be compulsory and will consist of short conceptual type answers based on four Units. There shall be EIGHT more questions, two from each Unit. A Student is required to attempt a total of FIVE questions in all. In addition to the compulsory question, students will have to attempt FOUR more questions selecting ONE question from each UNIT. All questions will carry equal marks.

Course Objectives: The aim of this course is to familiarize with the fundamentals of microcontroller 8051 and its programming.

Course Outcomes (CO): At the end of this course, the students will be able to:

CO1	Familiarize with the basic concepts of microcontroller 8051.
CO2	Understand the Interrupts, Addressing modes and Instruction set of 8051 microcontroller.
CO3	Learn programming techniques with 8051 microcontroller.
CO4	Learn the fundamental concepts of interfacing and to design basic applications being interfaced with 8051 microcontroller.

CO-PO Mapping Matrix for Course Code: CC-EEM -1											
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	3	2	3	1	3	2	3	2	1	2
CO2	3	3	3	3	1	3	2	2	2	1	2
CO3	3	3	3	3	2	3	2	2	2	1	2
CO4	3	3	3	3	2	3	2	3	2	2	3

CO-PSO Mapping Matrix for Course Code: CC-EEM -1			
COs	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3
CO2	2	3	3
CO3	2	3	3
CO4	2	3	3

Unit-I

Microcontroller 8051: Introduction and block diagram of 8051 microcontroller,architectureof 8051 family (in brief), memory organization, Internal RAM/ROM memory,General purpose data memory, special purpose/function registers, external memory. Counters and timers – 8051 oscillator and clock, program counter, TCON, TMOD, timer counter interrupts, timer modes of operation. Input/output ports and circuits/configurations, serial data input/output – SCON, PCON, serial data transmission modes.

Unit-II

8051- Interrupts, Addressing modes and Instruction set: Interrupts – IE, IP, time flag interrupts, serial port interrupt, external interrupts, reset, interrupt control, interrupt priority, interrupt destinations & software generated interrupts. Addressing modes, Data transfer instructions, Push and Pop and data exchange instructions, Logical Instructions,Arithmetic Instructions, simple programs in assembly language.

Unit-III

8051 programming in C: Jump and call instructions – jump and call program range, jumps, calls and subroutines, interrupts and returns, simple example programs in assembly language. 8051 programming using C– Data types and time delays in 8051 C, I/O programming, logic operations, data conversion programs, accessing code ROM space and data serialization. Timer/Counter Programming in 8051– Programming 8051 timers, counter programming, programming timers 0 and 1 in 8051 C.

Unit-III

Interfacing with 8051: Basic interfacing concepts and interrupts, Programming 8051 interrupts, programming Timer interrupts, programming the external hardware interrupts. Schematic diagrams and basic concepts of Interfacing of 8051 to keyboard, seven segment display, stepper motor, DAC, ADC and traffic light controller circuits.

References:

1. 8051Microcontroller&EmbeddedSystemsbyM.A.Mazidi,J.G.Mazidi&R.D.McKinlay.
2. The 8051 Microcontroller, architecture, programming and applications by K.J.Ayala.

Course Code: CC-EEM -4	Course Name: PRACTICAL - II	
Paper Code: EEM-403		
Type: Core Course (CC);	**Course Credits:** 02;	**Contact Hours:** 04 hours/week;
Examination Duration: 3 Hours;	**Mode:** Lab. Work	
External Maximum Marks: 40;	**Internal Maximum Marks:** 10	

Course Objectives: The aim of this course is to learn the practical aspects of Theory Papers.

List of Experiments: Minimum 6 experiments are to be performed in each of the Semesters.

8085 Microprocessor & 8051 Microcontroller:Programming &Applications

1. Familiarization with 8085 based microprocessor trainer kit by identifying different IC chips and their utilities. Understanding various functions of the kit, like, insertion, deletion, block-move, block-fill, examining registers/memory, single step, etc. by writing and executing simple programs for addition/subtraction of single and multibyte numbers.
2. Writing 8085 program for multiplication and division of two numbers.
3. Write 8085 program for arranging an array of data in ascending/descending order.
4. Write 8085 program for the generation of time delays of the order of 1-5 seconds and its testing by interfacing LED's to make them glow in a givensequence.
5. Study the IC Tester application on 8085 µPkit.
6. Study the Traffic Light Controller application of 8085 µPkit.
7. Familiarization with 8051 based microcontroller trainer kit. Practice in entering and executing simpleprograms, likeaddition/subtraction/smallest/largest of N 8-bit numbers.
8. Write a program on 8051 microcontroller kit to find that the given numbers is prime or not.
9. Write a program on 8051 microcontroller kit to glow the first four LEDs then next four using Timer application.
10. Use one of the four ports of 8051 for output interfaced to eight LED's. Simulatebinary counter (8 bit) on LED's .
11. Design a square wave of varying duty cycles on 8051 based microcontroller trainerkit.
12. Interface stepper motor with 8051 microcontroller and write a program to move the motorthrough a given angle in clock wise or counter clockwise direction.

KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme of Examinations for B.Sc. Home Science under CBCS/LOCF w.e.f. 2020-21 in Phased Manner

Semester-I

Course	Paper Code	Nomenclature	Credits	Contact Hr./week	Exam time (hr)	External Marks	Internal Marks	Total
CC1	HS101-A	Food Science	3	3	3	60	15	75
	HS101-B	Basic Nutrition	3	3	3	60	15	75
	HS101-(A+B)	Practical	2	4	3	50	-	50
CC2	HS102-A	Introduction to Human Development	4	4	3	80	20	100
	HS102-B	Life Span Development-I	4	4	3	80	20	100
CC3	HS103-A	Human Physiology & Promotive Health	4	4	3	80	20	100
	HS103-B	Introductory Chemistry	3	3	3	60	15	75
	HS103-B	Practical	1	2	3	25	-	25
AECC-1	ENG100	Functional English	2	2	3	40	10	50
OR								
	EVS	Environment Studies	2	2	3	40	10	50
Total			26	29				650

Semester-II

Course	Paper Code	Nomenclature	Credits	Contact Hr./week	Exam time (hr)	External Marks	Internal Marks	Total
CC4	HS201-A	Introduction to clothing and apparel selection	3	3	3	60	15	75
	HS201-B	Aesthetic in apparel, methods of developing designs	3	3	3	60	15	75
	HS201-(A+B)	Practical	2	4	3	50	-	50
CC5	HS202-A	Management of family resources	4	4	3	80	20	100
	HS202-B	Household Equipment & consumer protection	4	4	3	80	20	100
CC6	HS203-A	Hygiene	2	2	3	40	10	50
	HS203-B	Nutritional Biochemistry	3	3	3	60	15	75
	HS203-B	Practical	1	2	3	25	-	25
	HS 203 C	Introductory Bakery	2	4	3	50	-	50
AECC-2	EVS	Environment Studies	2	2	3	40	10	50
OR								
	ENG100	Functional English	2	2	3	40	10	50
Total			26	31				650

Semester-III

Course	Paper Code	Nomenclature	Credits	Contact Hr/week	Exam time (hr)	External Marks	Internal Marks	Total
CC7	HS301-A	Introduction to textile & Clothing construction	3	3	3	60	15	75
	HS301-B	Laundry Science & Finishing of Fabrics	3	3	3	60	15	75
	HS301-(A+B)	Practical	2	4	3	50	-	50
CC8	HS302-A	Housing and space management	3	3	3	60	15	75
	HS302-B	Interior Design & home décor	3	3	3	60	15	75
	HS302-(A+B)	Practical	2	4	3	50	-	50
CC9	HS303-A	Early Childhood Education & Children with special needs	3	3	3	60	15	75
	HS303-B	Life Span Development-II	3	3	3	60	15	75
	HS303-(A+B)	Practical	2	4	2	50	-	50
SEC-1	HS305	Personality Development	2	2	3	40	10	50
Total			26	32				650

Semester-IV

Course	Paper Code	Nomenclature	Credits	Contact Hr/week	Exam time (hr)	External Marks	Internal Marks	Total
CC10	HS401-A	Nutrition in Life Cycle	3	3	3	60	15	75
	HS401-B	Food preservation and Community Nutrition	3	3	3	60	15	75
	HS401-(A+B)	Practical	2	4	3	50	-	50
CC11	HS402-A	Family transition and population education	4	4	3	80	20	100
	HS402-B	Adulthood; Guidance & Counseling	3	3	3	60	15	75
	HS402-B	Practical	1	2	3	25	-	25
CC12	HS403-A	Community Development and Extension Education-I	3	3	3	60	15	75
	HS403-B	Community Development & Extension Education-II	3	3	3	60	15	75
	HS403-C	Computer Applications in Communication & Media Design	2	4	3	50	-	50
SEC-2	HS404	Basics of Physics	2	2	3	40	10	50
Total			26	31				650

Semester-V

Course	Paper Code	Nomenclature	Credits	Contact Hr/week	Exam time (hr)	External Marks	Internal Marks	Total
DSE1	HS501-A	Dietetics-I	4	4	3	80	20	100
	HS501-A	Practical	2	4	3	50	-	50
			OR					
	HS501-B	Therapeutic Nutrition-I	4	4	3	80	20	100
	HS501-B	Practical	2	4	3	50	-	50
DSE2	HS502-A	Entrepreneurial Techniques in Home Science-I	4	4	3	80	20	100
	HS502-A	Practical	2	4	3	50	-	50
			OR					
	HS502-B	Entrepreneurship & Enterprise Management-I	4	4	3	80	20	100
	HS502-B	Practical	2	4	3	50	-	50
DSE3	HS503-A	Indian Textiles Heritage and Designing	4	4	3	80	20	100
	HS503-A	Practical	2	4	3	50	-	50
			OR					
	HS503-B	MOOCS in relevant subject	6	-	-	-	-	150
SEC-3	HS504	E-Commerce of artifact	2	2	3	50	-	50
Total			20	26				500

Semester-VI

Course	Paper Code	Nomenclature	Credits	Contact Hr/week	Exam time (hr)	External Marks	Internal Marks	Total
DSE4	HS601-A	Dietetics-II	4	4	3	80	20	100
	HS601-A	Practical	2	4	3	50	-	50
		OR						
	HS601-B	Therapeutic Nutrition-II	4	4	3	80	20	100
	HS601-B	Practical	2	4	3	50	-	50
DSE5	HS602-A	Entrepreneurial Techniques in Home Science-II	4	4	3	80	20	100
	HS602-A	Practical	2	4	3	50	-	50
		OR						
	HS602-B	Entrepreneurship & Enterprise Management-II	4	4	3	80	20	100
	HS602-B	Practical	2	4	3	50	-	50
DSE6	HS603	Advance Apparel designing & Fashion illustrations	4	4	3	80	20	100
	HS603	Lab	2	4	3	50	-	50
SEC-4	HS604	Introductory cosmetology	2	4	3	50	-	50
Total			20	28				500

Total Credits

Course	Number of Courses	Credits	Contact Hours/ week	Marks (25/credit)
Core Course	12	96	117	2400
AECC	2	4	4	100
SEC	4	8	8	200
Discipline Specific Elective	6	36	48	900
Total	**24**	**144**	**177**	**3600**

*Practical exams will be held annually.

Total Credits: 96 Core + 04 AECC+ 8 SEC + 36 DSE = 144

Note: It is an interdisciplinary scheme. Hence, it will be taught by various Internal Departments of IIHS.

Programme Outcomes (POs) for UG courses of Faculty of Life Sciences

1. To develop skills in graduate students to be able to acquire theoretical and practical knowledge in fundamentals of biology in respective disciplines of plants, animals, microbes and environment.
2. To inculcate ability to critically evaluate problems and apply lateral thinking and analytical skills for professional development.
3. To create awareness on ethical issues, good laboratory practices and biosafety.
4. To develop ability in youth for understanding basic scientific learning and effective communication skills.
5. To prepare youth for career in teaching, industry, government organizations and self-reliant entrepreneurship.
6. To make students aware of natural resources and environment and its sustainable utilization.
7. To provide learning experience in students that instills deep interest in biological science for the benefit of society.

Programme Specific Outcomes (PSOs) for B.Sc. Home Science

1. **PSO1:** To impart knowledge and facilitate the development of skills and techniques in different areas of Home science (namely Foods, nutrition & dietetics, Human development, Textile and fashion technology and community resource management) required for personal, professional and community advancement.
2. **PSO2:** To inculcate in students, values and attitudes that enhance personal and family growth and to sensitize then to various social issues for the development of human society.
3. **PSO3:** To promote in students a scientific temper and competencies in research to enable contribution to the national and international knowledge base in Home science and allied fields.
4. **PSO4:** Consequently, to empower our women students such that they are able to effect positive changes at multiple levels.

B.Sc. (HOME SCIENCE)
SEMESTER – I
CC1: Food Science

Course No.: HS 101-A **MM: 60+15=75**

Time allowed: 3 Hrs.

Course Credit: 3

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each unit and one compulsory objective type question.

Instructions for the Candidate:

The candidates will attempt five questions in all, selecting two questions from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To acquire knowledge of various concepts of food science.
2. **CO2:** To develop the ability to apply the principles of food science into practical situation.
3. **CO3:** To know the importance of nutrition and various food groups.
4. **CO4:** To get knowledge about improving nutritional quality of various foods.
5. **CO5:** To equip with different cooking methods and techniques used while food preparation.

UNIT-I

1. Food - definition, classification and functions.
2. Food Groups and food guide pyramid along with its importance.
3. Basic food groups - composition and nutritional contributions of the following foods:
   - Cereals: composition and nutritive value
   - Pulses: Composition and nutritive value, toxic constituents in pulses, processing of pulses to remove toxins
   - Fruits and Vegetables: Composition and nutritive value, pigments in fruits and vegetables
   - Milk and Milk Products: Composition and nutritive value, processing of milk, types of milk and milk products
   - Nuts and Oilseed: Composition and nutritive value
   - Meat; Fish, Poultry: Composition and nutritive value
   - Egg: Composition and nutritive value
   - Condiments and spices: Composition and nutritive value,
   - Sugar and Jaggery: Composition and nutritive value, types of sugars.

UNIT-II

1. Cooking:
   - Definition, objectives and principles of cooking of food.
   - Different methods of cooking- their merits and demerits.
   - Effect on cooking and heat on nutritive values of foods.

2. Improving nutritional quality of foods using methods:
   - Germination,
   - Fermentation,
   - Supplementation
   - Fortification and Enrichment.

REFERENCES:

1. Srilakshmi, B. (2001) Food Science (2nd edition). New Age International Pvt. Ltd. Publishers: New Delhi.
2. Antia, F.P. (1990) Clinical Dietetics and Nutrition. Oxford Univ. Press: Delhi/Bombay.
3. Rajalakshmi, R. (1990) Applied Nutrition (3rd ed.) Oxford and IBH Pub. Co. Pvt. Ltd.: New Delhi.
4. Swaminathan, M. (1988). Essentials of Food and Nutrition - An Advanced Text Book Vol. I and II. (2nd ed.) BAPPCO: Bangalore.
5. Swaminathan, M. Food Science. BAPPCO: Bangalore.
6. Mudambi, S.R. and Rao S. Fundamentals of Food & Nutrition. (2nd ed.) Wiley Eastern Ltd.: New Delhi.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 101-A: Food Science

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3
CO3	3	2	3	3	3	2	3
CO4	3	3	2	3	3	3	3
CO5	3	2	3	2	3	3	3
Average	3	2.6	2.8	2.8	3	2.8	3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 101-A: Food Science

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3
CO2	3	3	3	2
CO3	3	2	3	3
CO4	2	3	3	3
CO5	2	3	3	3
Average	2.6	2.8	2.8	2.8

PRACTICAL
Food Science

MM: 25
Time allowed: 3 Hrs.
Course Credit- 1

Course Outcomes: The course learning outcomes for practical of this course are-

1. **CO1:** Prepare various recipes using various cooking methods.
2. **CO2:** To calculate the nutritive value of the recipe prepared.

Syllabus:

1. Laboratory conduct and responsibilities
2. Knowledge of different food stuffs in English, Hindi and local language.
3. Terms used in cookery
4. Weight and measures
5. Identification and listing of various food groups along with their standard weights equivalent to household measures.
6. Preparation of Recipes:
   - Rice: Plain rice and Pulao
   - Chapatti: Plain roti and Missi roti
   - Parantha: Stuffed parantha, Pizza parantha
   - Idli: Plain, stuffed idli and fried idli
   - Bread Recipes: Ghughra sandwich, Bread Pizza
   - Fried Recipes: Pin wheel samosa, Pizza puf
   - Besan Recipes: Chilla and Dhokla
7. Recipes based on Germination:
   - Sprouted moong dal chat
   - Sprouted moong dal chilla
8. Recipes based on Fermentation:
   - Kulcha
   - Bhatura
   - Recipes based on Supplementation:
   - Paushtik Khichri
   - Nutritious Poha

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 101-A (Practical): Food Science

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	3
CO2	3	3	2	3	2	3	3
Average	3	2.5	2.5	2.5	2	2.5	3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 101-A (Practical): Food Science

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3
CO2	3	2	3	2
Average	3	2	2.5	2.5

B.Sc. (HOME SCIENCE)
SEMESTER – I
CC1: Basic Nutrition

Course No.: HS 101-B **MM: 60+15=75**

Time allowed: 3 Hrs.

Course Credit: 3

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each unit and one compulsory objective type question.

Instructions for the Candidate:

The candidates will attempt five questions in all, selecting two questions from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To enable students to understand the relation of nutrition to health.
2. **CO2:** To understand the functions, sources, requirements and effects of excess and deficiency of different nutrients.
3. **CO3:** To get knowledge about recommended dietary allowances of various nutrients.
4. **CO4:** To learn culinary skills involved in preparation of various nutritious dishes.

UNIT-I

1. Nutrients in food: Definition, functions, sources, recommended dietary allowances, effects of deficiency and excess (in brief) of Carbohydrates, Proteins, Lipids
2. Water: Functions and sources of water for human body, effects of excess and low intake of water on human body.
3. Fibre: Types of fibre, functions or role of dietary fibre in the human body, sources of fibre and effect of deficiency of fibre in human beings.

UNIT-II

1. Functions, sources, recommended dietary allowances, effects of excess & deficiency (in brief) of
   - Fat soluble vitamins: Vitamin A, Vitamin D, Vitamin E and Vitamin K
   - Water soluble vitamins: Vitamin C, Vitamin B1 (Thiamine), Vitamin B2, (Riboflavin), Vitamin B6 (Pyridoxin), Vitamin B12 (Cyanocobalamin), Niacin and folic acid.

2. Functions, Sources, RDA, Effect of Excess and low intake of
   - Macro Minerals: Calcium, Magnesium, Phosphorus, Sodium and Potassium
   - Micro Minerals: Iron, Iodine and Fluorine.

REFERENCES:

1. Bamiji, M.S.; Rao, N.P. and Reddy, V. (Editors) (1999). Textbook of Human Nutrition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
2. ICMR (1990). Nutrient Requirements and Recommended Dietary Allowance for Indians. A Report of the Expert Group of ICMR. NIN, Hyderabad.
3. Joshi, S.A. (2002). Nutrition and Dietetics (2nd ed.) New Delhi: Tata Mc Graw Hill Pub. Co. Ltd.
4. Kaushik, V.K. (1998). Readings in Food, Nutrition and Dietetics Vol. I and II. Jaipur Book Enclave.
5. Khanna, K; Gupta, S; Pasi SJ; Seth, R; Mahna, R and Puri, S. (2010). Nutrition and Dietetics. New Delhi: Elite Publishing House.
6. Narsinga Rao BS (1988). Dietary fibre in Indian diets and its nutritional significance. Nutrition Foundation of India Bulletin 9 (4).
7. Robinson CH and Lawler MR (1982). Normal and Therapeutic Nutrition (16th ed) New York: mcMillion Pub. Co. Inc.
8. Srilakshmi, B. (2002). Nutrition Science. New Age International Limited, Publishers, New Delhi.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 101-B: Basic Nutrition

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	3	3	2	3
CO2	2	3	2	2	3	3	3
CO3	3	2	3	3	3	2	2
CO4	2	3	2	3	3	2	3
Average	2.5	2.5	2.0	2.75	3	2.25	2.75

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 101-B: Basic Nutrition

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	3
CO2	2	2	3	2
CO3	3	3	2	3
CO4	2	3	2	3
Average	2.5	2.5	2.0	2.75

PRACTICAL
Basic Nutrition

MM: 25
Time allowed: 3 Hrs.
Course Credit: 1

Course Outcomes: The course learning outcomes for practical of this course are-

1. **CO1:** Prepare various nutrient specific rich recipes.
2. **CO2:** To calculate the nutritive value of the recipe prepared and understand its nutritional facts.

Syllabus:

1. Snacks (Two recipes each)
    - Vitamin A rich snacks
    - Iron rich snacks
    - Calcium rich snacks
    - Protein rich snacks
    - Energy rich
    - Low fat
2. Main course dish: Any Two
    - Cheese Chilly
    - Manchurian
    - Ghia Kofta
    - Dal Makhani
    - Vegetable Korma
    - Any other two of your choice
3. Beverages
    - Hot: Different types of tea and coffee
    - Cold: Fruit punch and any shake or masala lassi, smoothies
4. Salad: Any Two
    - Russian salad
    - Corn salad
    - Any other two of your choice
5. Soups: Any Two
    - Tomato soup
    - Dal soup
    - Minnestrone soup

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 101-B (Practical): Basic Nutrition

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	2	2	3
CO2	3	3	2	3	2	3	3
Average	2.5	2.5	2.0	2.5	2.0	2.5	3.0

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 101-B (Practical): Basic Nutrition

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	3
CO2	2	2	3	2
Average	2.0	2.0	2.5	2.5

B.Sc. (HOME SCIENCE)
SEMESTER – I
CC2: Introduction to Human Development

Course No.: HS 102-A **MM: 80+20=100**

Time allowed: 3 Hrs.

Course Credit: 4

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each unit and one compulsory objective type question.

Instructions for the Candidate:

The candidates will attempt five questions in all, selecting two questions from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To understand and identify key concepts in multiple areas of lifespan psychology including concepts, facts and theoretical perspectives
2. **CO2:** To identify the basic research and evaluation methods used in lifespan psychology, including the strengths and weaknesses of each method.
3. **CO3:** To have knowledge of and explain concepts related to human development.
4. **CO4:** To apply development theory to the analysis of child observations, surveys, and interviews using investigative research methodologies.

UNIT-I

1. Human development as a discipline, Importance of studying Human development and multidisciplinary nature of Human Development.
2. Understanding the meaning of Growth & Development and study the differences between them.
3. Concept and principles of Human Growth and Development.
4. Trends and issues of human development (nature versus nurture; continuity versus discontinuity; early experience versus later experience).
5. Stages and domains of human development throughout life.

UNIT-II

1. Theories of Development: Psychoanalytic theory of Sigmund Freud and Erik Erikson's psychosocial theory, cognitive theory of Piaget, Bandura's social cognitive theory.
2. Developmental tasks during life span including physical, motor, social, emotional, cognitive, language and moral development.
3. Methods of Child Study and data collection - observation, interview, questionnaire, case study, experimental, cross-sectional, longitudinal methods.

REFERENCES:

1. Hurlock, Elizabeth B. (1987). Developmental Psychology, A life-span approach. Fifth Edition. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Hurlock, Elizabeth B. (1987). Child Development Sixth Edition. MC- Graw Hill Book Co. New Delhi.
3. Berk, Laura E (1999). Child Development. Prentice Hall of India, Private Ltd. New Delhi.
4. Papalie, Diane E. (1986). A child's World. Fourth Edition. McGraw Hill Book Company New Delhi.
5. Ambron S.R. (19710): Child Development, Rinchart Prep, San Francisco.
6. Lerner Hultsch (1983): Human Development, A life span perspective, New York, McGraw Hill Book, Co.
7. Saraswathi, T.S. & Kaur, B. (1993): The development of Children, New York: Scientific American Books.
8. Gordon, L.J. (19710), Human Development New York: Harper & Row.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 102-A: Introduction to Human Development

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	1	2	2	2	3
CO2	3	3	2	1	2	3	3
CO3	3	3	2	3	3	2	3
CO4	2	3	3	3	3	2	3
Average	2.5	2.75	2.0	2.25	2.5	2.25	3.0

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 102-A: Introduction to Human Development

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2
CO2	3	2	3	2
CO3	3	3	3	3
CO4	3	3	3	3
Average	3.0	2.5	2.75	2.5

B.Sc. (HOME SCIENCE)
SEMESTER – I
CC2: Life Span Development-I

Course No.: HS 102-B **MM: 80+20=100**

Time allowed: 3 Hrs.

Course Credit: 4

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each unit and one compulsory objective type question.

Instructions for the Candidate:

The candidates will attempt five questions in all, selecting two questions from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To analyze major developmental milestones for children from conception through early childhood in the areas of physical, psychological, cognitive, and language development.
2. **CO2:** To know about the stages of prenatal development and the significance of prenatal care.
3. **CO3:** To examine and evaluate the role of play and its relationship to development at various stages.
4. **CO4:** To Apply lifespan psychological concepts to the solutions of current issues and problems of prenatal development and infancy.

UNIT-I

1. Life span development during prenatal stage:
   - Conception, signs of pregnancy and discomforts during pregnancy.
   - Teratology and hazards to prenatal development.
2. Stages of prenatal development:
   - Prenatal growth and activities in first, second and third trimesters of pregnancy.
   - The birth process (stages of delivery of baby and placenta), complications during delivery and types of birth.
3. Care of the infant (0-2 years)
   - Physical Characteristics of the neonate- size, weight, body-proportion, body temperature, neonatal capacities and reflex actions, screening test for newborn (APGAR scale).

- Rearing and care of the infant- feeding, weaning, sleeping, bathing and toilet training.
- Common diseases and immunization during infancy.

UNIT-II

1. Developmental milestones of infancy (0-2 years) and early childhood (3-6 years):
   - Physical and motor development
   - Social and emotional development
   - Cognitive and language development
2. Play: types, functions and Importance of play in infancy and preschool years.
3. Role of family, peers and television in young child's life.

REFERENCES:

1. Hurlock, Elizabeth B. (1987). Developmental Psychology, A life-span approach. Fifth Edition. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Hurlock, Elizabeth B. (1987). Child Development Sixth Edition. MC-Graw Hill Book Co. New Delhi.
3. Berk, Laura E (1999). Child Development. Prentice Hall of India, Private Ltd. New Delhi.
4. Papalie, Diane E. (1986). A child's World. Fourth Edition. McGraw Hill Book Company New Delhi.
5. Ambron S.R. (19710): Child Development, Rinchart Prep, SanFrancisco.
6. Lerner Hultsch (1983): Human Development a life span perspective, New York, McGraw Hill Book, Co.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 102-B: Life Span Development- I

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	3	3	1	3
CO2	3	2	2	2	3	3	3
CO3	2	3	3	3	3	3	3
CO4	1	3	3	3	3	2	3
Average	2.25	2.5	2.25	2.75	3.0	2.25	3.0

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 102-B: Life Span Development- I

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3
CO2	3	3	2	2
CO3	3	3	2	3
CO4	3	3	3	3
Average	3.0	3.0	2.25	2.75

B.Sc. (HOME SCIENCE)
SEMESTER – I
CC3: A Human Physiology & Promotive Health

Course No.: HS 103-A **MM: 80+20=100**

Time allowed: 3 Hrs.

Course Credit: 4

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four question from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To define various systems in body.
2. **CO2:** To acquire knowledge of digestive system as a base for human nutrition.
3. **CO3:** To illustrate reproductive system as a pillar for human development.
4. **CO4:** To enable students to gain knowledge about prevention of disease in relation with nutrition.

UNIT-I

1. The Cell
   - Animal cell structure, composition of protoplasm.
   - Cell division mitosis and meiosis, difference between mitosis and meiosis.
2. The Skeleton
   - Different Bones (Names & Number)
   - Joints of the Skeleton (Names with examples)
3. The Digestive System
   - Structure and functions of various parts of alimentary canal
   - Digestion in the stomach, Digestion and absorption in small intestine and large intestine
   - Digestive glands- functions of liver, pancreas and salivary glands, role of hormones in digestive system.

4. The Circulatory System

- Composition and functions of blood
- Structure and Functions of heart
- Blood Pressure

UNIT-II

1. The Respiratory System
   - Respiratory passage; its parts & functions
   - Structure and functions of lungs.
2. The Excretory System
   - Structure and functions of kidneys
   - Mechanism of urine formation
3. The Reproductive System
   - Structure of reproductive organs in a woman, menstrual cycle
   - Role of hormones in reproductive health
4. The Nervous System
   - Major parts of the nervous system
   - Structure and functions of brain, spinal cord and nerve cell (Neuron)
   - Sense organs - Structure of Eye and Ear
   - Eye defects
5. Concept of Positive Health
6. Immunity
   - Definition and types of immunity
   - Vaccination schedule (Triple Vaccine, BCG, Polio drops etc.)

REFERENCES:

1. Chaterzeee (1988) Human Physiology, Calcutta, Medical Agency.
2. Pears E.C. (1988) Anatomy and Physiology for nurses- Delhi Oxford University, Press.
3. Clothing Textile and Physiology- Ritu Kapoor Vidaya Publications, Ludhiana.
4. A text book of biology- Dhami & Dhami Pradeep Publications.
5. Elementary biology- K N Bhati

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 103-A: Human Physiology & Promotive Health

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	3	1	3
CO2	3	3	2	2	3	2	3
CO3	3	2	3	2	3	-	3
CO4	3	3	2	2	3	2	3
Average	3.0	2.75	2.25	2.0	3.0	1.6	3.0

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 103-A: Human Physiology & Promotive Health

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2
CO2	3	2	3	2
CO3	3	2	3	3
CO4	3	3	3	3
Average	3.0	2.75	3.0	2.5

B.Sc. (HOME SCIENCE)
SEMESTER – I
Introductory Chemistry

Course No.: HS 103-B **MM: 60+15=75**

Time allowed: 3 Hrs.

Course Credit: 3

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four question from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To have comprehensive knowledge understanding of major concept of chemistry.
2. **CO2:** To enable students to use modern instrumentation for chemical analysis in relation with home science.
3. **CO3:** To review and apply knowledge of chemicals in the fields of clothing and textiles.

UNIT-I

1. Concept of element, mixture and compound. Atomic and Molecular masses. Mole Concept and Molar masses, Normality. Molarity and Mass percentage. Simple numerical problems based on them.
2. Subatomic particles: Electrons, Protons and Neutrons, Atomic No., Atomic Weight, Bohr's model of an atom.
3. Modern Periodic Law and Periodic Table, Electronic configuration of elements (Na, Mg, C, N, O, F, Cl, H). Periodic properties: Atomic size, Ionization energy, Electron affinity and Electronegativity.

UNIT-II

1. Chemical Bonding: Ionic, Covalent, Coordinate and H-bonding.
2. Concept of Acids, Bases & Salts, pH and pH Scale. Numerical based on pH. Buffer solutions. Concept of oxidation and reduction.
3. Soaps and synthetic detergents, advantages and disadvantages.
4. Synthetic Polymers: Structure and uses of the following polymers (PVC, Teflon, Nylon - 6, 6 Polyester).
5. Chemical Composition in Cosmetics: Creams, Perfumes, Talcum Powder, Deodorants, Lipsticks, Nailpolish, Shampoo & Hair dye.
6. Paints and Varnishes their composition and uses.

REFERENCES:

1. Conceptual chemistry for class XI by S.K. Jain, R. Chand.
2. NCERT Chemistry for class XI & XII.
3. Pradeep's New Course Chemistry Class XI & XII by S.N. Dhawan, Kheterpal & P.N. Kapil.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 103-B: Introductory Chemistry

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2.5	2	2.5	3	2	3
CO2	3	2.5	3	2.5	3	3	3
CO3	3	3	2	2.5	3	3	3
Average	3	2.6	2.3	2.5	3	2.6	3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 103-B: Introductory Chemistry

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1.5	3	2
CO2	3	2.5	2.5	2
CO3	2.5	2	2	2.5
Average	2.8	2	2.5	1

PRACTICAL
Introductory Chemistry

MM: 25
Time allowed: 3 Hrs.
Course Credit- 1

Course Outcomes: The course learning outcomes for practical of this course are-

1. **CO1:** To gain knowledge about preparation of standard solutions in the lab.
2. **CO2:** To acquire hands-on experience with using instruments for chemical analysis in relation to Home Science.

Syllabus:

1. Preparation of solutions (Normal/Molar), Sodium Hydroxide, Sodium Carbonate and Hydrochloric Acid.
2. Preparation of Crystals of Copper Sulphate and Potash Alum.
3. To determine the normality and strength of given Sodium Hydroxide Solution by volumetric titrations using phenolphthalein as an indicator.
4. To determine the normality of the given HCl solution by titrating it against standard Sodium Carbonate solution using methyl orange as an indicator.
5. Preparation of Soaps, using any two oils (Coconut oil/ castor oil).

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 103-B (Practical): Introductory Chemistry

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1.5	2	2	2	1	3
CO2	2.5	2.5	2.5	3	3	2	2.5
Average	2.7	2	2.2	2.5	2.5	1.5	2.7

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 103-B (Practical): Introductory Chemistry

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	1
CO2	3	2.5	3	3
Average	3	2.2	3	2

B.Sc. (HOME SCIENCE)
SEMESTER – I
AECC-1: Functional English / Environment Studies

Course No.: ENG 100/ EVS **MM: 50**

Time allowed: 3 Hrs.

Course Credit: 3

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC4: An Introduction to Clothing and Apparel Selection

Course No.: HS 201-A **MM: 60+15=75**

Time allowed: 3 Hrs.

Course Credit: 3

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To understand the elements and principles of designing.
2. **CO2:** To understand the concept of renovating and mending of clothing.
3. **CO3:** To provide the students with the sense of clothing and fashion in different age groups.
4. **CO4:** To understand the concepts of clothing in relation to complexion, figure and occasion.

UNIT-I

1. Basic Terminology used for clothing:
   - Fiber- filament, staple, natural fiber, synthetic fiber, regenerated fiber, luster.
   - Yarn- spun yarn, filament yarn, yarn twist.
   - Fabric- selvedge; grain-lengthwise, crosswise, bias; warp, weft.
   - Garment- allowance, applique, armhole, basic pattern, clip, cord piping, cap, dart, drape, dress form, drop, ease, facing, fastening, flap, fray, facing, gathers, hem, hemline, interfacing, loop, lining, notch, pinking, piping, placket, pucker, princess line, rip, contour, silhouette, cutting line, stitching line, stay stitching, smocking, seam, tucks, top stitch, etc.
2. Equipment and Sewing tools used for measuring, drafting, cutting and stitching and their maintenance.
3. Parts of Sewing Machine and their functioning:
   - Defects and remedies
   - Care of Sewing Machine

4. Anthropometry:
    - Definition, Importance and equipment required
    - Measurements needed for different garments (frock, blouse, lady's shirt, salwar, churidar, pyjama/ pant)
    - Types of anthropometric measurements (vertical, horizontal, girth/round measurement)
    - Care to be taken while recording body measurement
    - Limitations of taking direct measurement

UNIT-II

1. Meaning and Importance of Clothing.
2. Clothing requirements for infants, toddlers, preschoolers and elementary school children.
3. Factors affecting selection of clothing:
    - Social Factors
    - Economic Factors
    - Environmental Factors
    - Physiological Factors
4. Clothing requirements for different physiological conditions.
    - Pregnant lady
    - Lactating mother
5. Care and Storage of clothing:
    - Mending
    - Renovation
    - Storage

REFERENCES:

1. Tanous, Helen Nicol: Designing Dress Patterns, Illinois, Chas A. Bennettco
2. Bane, A./ (1974): Tailoring, Mc graw Hill
3. Bray Nathalie (1978): Dress Pattern Designing, London, Crossby Lockwood and Staples
4. Goldsworthy, M. (1980); Simple dressmaking, London, Mills and Boon Ltd.
5. Goldsworth, M. (1980): Sample Dressmaking, Mills and boon Ltd.
6. Sushma Gupta, Neeru Garg and Renu SainiTest book of clothing and textiles and laundry – Kalyani Pub.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 201-A: An Introduction to Clothing and Apparel Selection

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	2	2	2
CO2	2	1.5	2	2	1.5	2	3
CO3	2	2.5	3	2	2	2	2
CO4	1.5	2	2.5	2	1.5	2	2.5
Average	1.7	2	2.3	2	1.7	2	2.3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 201-A: An Introduction to Clothing and Apparel Selection

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3.0
CO2	3	3	2	3.0
CO3	3	2	2.5	3.0
CO4	3	3	2	2.5
Average	3.0	2.5	2.1	2.8

PRACTICAL
An Introduction to Clothing and Apparel Selection

MM: 25
Time allowed: 3 Hrs.
Course Credit- 1

Course Outcomes: The course learning outcomes for this course are-

1. Knowledge about the application of tools, equipment and part of sewing machine.
2. Develop measurement skills for taking body measurements.
3. Provides understanding about basic stiches.
4. Enhancement of knowledge by various methods of mending and renovation techniques of fabric.

Syllabus:

1. Use and care of parts of sewing machine and other equipment used in clothing construction.
2. Methods of taking body measurements.
3. Making samples of the following basic stitches – Hemming, tacking, back stitch, running stitch, interlock stitch, buttonhole and application of fasteners.
4. Mending: Patching, Darning, Quilting
5. Renovation: To make an article of pouches, bags, decorative piece etc. by renovating a used cloth with help of various basic stitches and mending techniques.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 201-A (Practical): An Introduction to Clothing and Apparel Selection

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	1.5	2	3	1	2
CO2	1.5	2	2	1	2.5	2	2
CO3	1	2	1.5	1	3	1	1.5
CO4	2	2	2	1	2.5	2	1.5
Average	1.3	2	1.7	1.2	2.7	1.5	1.7

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 201-A (Practical): An Introduction to Clothing and Apparel Selection

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	2
CO2	3	1	1	2
CO3	2	1	2	1
CO4	2	2	1	1
Average	2.5	1.2	1.5	1.5

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC4: Aesthetic in Apparel and Methods of Developing Design

Course No.: HS 201-B **MM: 60+15=75**

Time allowed: 3 Hrs.

Course Credit: 3

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To understand the role and function of clothing.
2. **CO2:** To acquire knowledge of process of garment construction.
3. **CO3:** To develop skills required for sewing and stitching.
4. **CO4:** To develop creative skills required for garment designing.

UNIT-I

1. Principles of design in clothing and their importance in apparel designing.
2. Fashion designing from a digital perspective.
3. Analysis of design elements in apparel in relation to figure, complexion, occasion, size and season:
   - Analysis of line
   - Analysis of shape
   - Analysis of color
   - Analysis of texture

UNIT-II

1. Methods of developing design/ pattern:
   - Drafting: Drafting tools, techniques, advantages and disadvantages of drafting.

- Paper pattern: Types and principles of paper pattern and advantages and disadvantages of paper pattern.
- Draping: Techniques of draping and advantages and disadvantages of draping.

2. Preparation of fabric in clothing construction:
   - Preparation of fabric: Preshrinking, Straightening the grain, Pressing, Identify Face and back, Square up
   - Layout: Surface, Types of fabric folds, factors considered for layout
   - Marking: Pinning, types of markings, precautions
   - Cutting: Methods and Precautions
   - Sewing: Preparing machine; Sewing tips, methods and precautions
   - Finishing: Seam allowance neatening; Removal of bastings, threads, marks; Pressing and folding

REFERENCES:

1. Tate and Grissom: Family clothing, Bray Nathalie (1978): Dress Pattern Designing, London, Crossby
2. Lockwood and Staples, Goldsworthy, M. (1980); Simple dressmaking, London, Mills and Boon Ltd.
3. Teery Brackenbury: Knitted Clothing Technology, Blackwell Science Ltd., London.
4. Gupta Sushma (2005) TextBook of Clothing Textiles and Laundry, Kalyani Publishers New Delhi.
5. Sushma Gupta, Neeru Garg and Renu Saini: Textbook of Clothing, Taxtile & Laundry, Kalyani Pub.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 201-B: Aesthetic in Apparel and Methods of Developing Design

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2.5	2.0	1.0	2.0	3.0	2.0	1.0
CO2	3.0	2.0	2.5	1.0	3.0	1.0	2.0
CO3	3.0	2.5	2.0	1.0	3.0	1.0	1.0
CO4	3.0	1.0	2.0	2.0	3.0	2.0	1.5
Average	2.8	1.7	1.8	1.5	3.0	1.5	1.3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 201-B: Aesthetic in Apparel and Methods of Developing Design

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3.0	2.0	3.0	3.0
CO2	3.0	2.5	3.0	3.0
CO3	3.0	3.0	3.0	3.0
CO4	3.0	2.5	3.0	3.0
Average	3.0	2.8	3.0	3.0

PRACTICAL
Aesthetic in Apparel and Methods of Developing Design

MM: 25
Time allowed: 3 Hrs.
Course Credit- 1

Course Outcomes: The course learning outcomes for this course are-

1. Enrichment of knowledge about seems and processes used in apparel designing.
2. Familiarization with basic embroidery stitches.
3. Develop capability for drafting and cutting of garments.
4. skill acquisition for construction of different garments.

Syllabus:

1. Making samples of the following:
   - Seams- plain seam, counter seam, run and fell seam, French seam and mantua maker.
   - Processes- pleats, tucks, gather's with band, darts and plackets.
2. Embroidery stitches:
   - Stem stitch, Chain stitch, Feather stitch, Herring bone stitch, Satin stitch, Lazy daisy stitch, French knots, Bullions stitch, Cross stitch, Long and short stitch
3. Drafting, cutting and stitching of simple garments.
   - Drafting of child's bodice block and sleeve block, Nappy, Bib, Jhabla, Bloomer

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 201-B (Practical): Aesthetic in Apparel and Methods of Developing Design

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2.5	2	1	2	3	2	1
CO2	3	2	2.5	1	3	1	2
CO3	3	2.5	2	1	3	1	1
CO4	3	1	2	2	3	2	1.5
Average	2.8	1.7	1.8	1.5	3	1.5	1.3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 201-B (Practical): Aesthetic in Apparel and Methods of Developing Design

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3
CO2	3	2.5	3	3
CO3	3	3	3	3
CO4	3	2.5	3	3
Average	3	2.8	3	3

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC5: Management of Family Resources

Course No.: HS 202-A **MM: 80+20=100**

Time allowed: 3 Hrs.

Course Credit: 4

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To understand the concept of human and non-human resources and its functions.
2. **CO2:** To acquaint students with the skills of management of time.
3. **CO3:** To skill students about work simplification techniques and energy management.
4. **CO4:** To impart knowledge about savings, investments, budget and energy management.

UNIT-I

1. Definition, concept and objectives of home management
2. Process of Management: Planning, organizing, controlling and evaluation
3. Family life cycle and its stages
4. Qualities and responsibilities of a good home maker
5. Motivating factors of management:
   - Values: Definition, classification and characteristics
   - Goals: Definition, classification, characteristics and factors affecting goal setting
   - Standards: Definition, classification and characteristics
6. Process of decision making:
   - Definition and importance of decision making
   - Types of decision
   - Steps in decision making process
7. Resources: Meaning, classification and characteristics

UNIT-II

1. Time Management:
   - Time demand during various stages of family life cycle
   - Time and utility plan: Characters to consider in making time and utility plan, steps in making time and utility plan
   - Steps in management of time
2. Energy Management
   - Energy demand during various stages of family life cycle
   - Management of energy (Planning, Controlling and evaluating)
   - Types of efforts
   - Types of fatigue and various ways to overcome fatigue
3. Work Simplification:
   - Definition, Importance and Techniques of work simplification
4. Ergonomics:
   - Concept, significance and principles of ergonomics
5. Money Management:
   - Sources of Money: Wages, Salary, Rent, Profits, Interests
   - Types of Income: Regular and Irregular income
   - Types of Expenditure and factors affecting family expenditure
   - Types of buying: Cash Buying, Credit Buying, and other ways of buying
   - Budget: Definition, importance and types of budget
   - Savings and investments: Meaning, objectives and types

REFERENCES:

1. Mann, M.K. (2004). Home Management for Indian Families. Kalyani Publisher, Ludhiana.
2. Bela Bhargava (2005). Family Resource Management and Interior decoration. Apple Printer and V.R. Printers, Jaipur.
3. Nickell, P. and Dorsey, J.M. (1970). Management of Family Living. Wiley Eastern, New Delhi
4. Premalatha Mullick (2011). Textbook of Home Science, Kalyani Publishers, New Delhi.
5. Sushma Gupta, Neeru Garg and Amita Aggarwal (1993). Home Management, Hygiene and Physiology. Kalyani Publishers, Ludhiana.
6. The Educational Planning Group

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 202-A: Management of Family Resources

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	3	2	3
CO2	2	3	2	2	3	3	2
CO3	3	2	3	2	2	2	2
CO4	2	2	2	2	1	3	1
Average	2.25	2.25	2.25	2.0	2.25	2.5	2.0

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 202-A: Management of Family Resources

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	3
CO2	2	2	2	2
CO3	3	2	3	3
CO4	2	2	3	3
Average	2.25	2.0	2.5	2.75

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC5: A Household Equipment & Consumer Protection

Course No.: HS 202-B **MM: 80+20=100**

Time allowed: 3 Hrs.

Course Credit: 4

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To get knowledge and working of household equipment and tools.
2. **CO2:** To equip the students with proper care and storage of household equipment.
3. **CO3:** To make aware about consumerism.
4. **CO4:** To acquaint with consumer protection laws.

UNIT-I

1. Difference between equipment and tools. Factors affecting requirement of household equipment.
2. Use, care, and storage of household equipment.
3. Kitchen tools and equipment
   - Classification on the basis of their mode of operation: Hand operated, Electrically operated
   - Classification on the basis of their utility: Major kitchen equipment and minor kitchen equipment
   - Classification on the basis of their use: Cooking utensils and Serving utensils
4. Equipment for personal care and recreation: Hair dryer, hair straightener, Epilator, water filter, Iron, air conditioner, television, radio, L.C.D, C.D. player, cell phone, computer and laptop, inverter.
5. Equipment related to cleaning and washing: Manual and electrical equipment including washing machine, vacuum cleaner, immersion rods, floor scrubber etc.

UNIT-II

1. Consumer: Definition and role of consumer in market
2. Rights, responsibilities and problems of consumers
3. Consumer Protection Laws in India
4. Consumer Protection Act
5. Standardizing and Quality control measures
   - ISI, BIS, FPO, AGMARK, Eco mark, Wool mark, Silk mark, Cotton mark, Handloom mark, BEE star labelling.
6. FSSAI: Regulation on food labelling
7. Consumer protection Agencies:
   - Consumer Education and Research Centre (CERC), Federation of consumer organization in Tamil Nadu (FEDCOT), Citizen consumer and civil action group, Consumer guidance society of India (CGSI), Consumer unity of trust society
8. Buying and paying for goods and services
   - Cash buying
   - Credit buying
   - Guarantees
   - Warrantees

REFERENCES:

1. Bela Bhargava (2005). Family Resource Management and Interior decoration. Apple Printer and V.R. Printers, Jaipur.
2. Home Management- A Textbook of Home Science for Senior Students. The Educational Planning Group, Arya Publishing House, Karol Bagh, New Delhi.
3. Varghese, M.N., Ogale, N.N. and Srinivasaan, K. (1992). Home Management. Wiley Eastern, New Delhi.
4. Premalatha Mullick (2011). Textbook of Home Science, Kalyani Publishers, New Delhi.
5. Sushma Gupta, Neeru Garg and Amita Aggarwal (1993). Home Management, Hygiene and Physiology. Kalyani Publishers, Ludhiana.
6. Mann, M.K. (2004). Home Management for Indian Families. Kalyani Publisher, Ludhiana.
7. Singh, S. (2007). Ergonomics Integration for Health and Productivity. Himanshu Publications, Udaipur and New Delhi.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 202-B: Household Equipment & Consumer Protection

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	3	3	2
CO2	2	3	2	3	2	2	2
CO3	3	2	2	3	3	2	2
CO4	2	3	1	2	2	3	1
Average	2.25	2.5	1.75	2.5	2.5	2.5	1.75

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 202-B: Household Equipment & Consumer Protection

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	3
CO2	2	2	2	2
CO3	3	2	3	3
CO4	2	2	3	3
Average	2.25	2.0	2.5	2.75

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC6: Hygiene

Course No.: HS 203-A **MM: 40+10=50**

Time allowed: 3 Hrs.

Course Credit: 2

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four question from each section/unit and one compulsory objective type question.

Instructions for the Candidate:

The candidate will attempt five questions in all, selecting at least one question from each unit as well as compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To define concepts of promotive health, disease and prevention.
2. **CO2:** To illustrate various communicable and non-communicable disease.
3. **CO3:** To acquire personal and hygiene.

UNIT-I

1. Infectious Diseases- Causes, Symptoms, Mode of Spread, Treatment and Prevention.
2. Diseases spread through Water and Food- Cholera, Diarrhòea, Hepatitis, and Tuberculosis.
3. Diseases spread by insects- Malaria, Dengue.
4. Diseases caused by viruses- Polio, measles, chicken pox, cold.
5. Diseases spread by contact and soil - Leprosy, Tetanus.
6. Immune Disorders- AIDS.

UNIT-II

1. Personal Hygiene
   - Physical Health- Regular Habits in daily living, eating and eliminating, cleanliness of body and different organs.
   - Mental Health- meaning, types and management of stress, rest and sleep.

2. Institutional Hygiene
3. Public health organizations- WHO, ICMR and National Health Programmes (Malaria Eradication, Leprosy and Tuberculosis, Pulse Polio).

REFERENCES:

1. Hygiene and preventive medicine- Yashpal Bedi.
2. Home Management and Hygiene- Sweera Relhan, Dinesh Publication

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 203-A: Hygiene

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3.0	2.0	3.0	2.0	2.0	1.0	1.0
CO2	2.5	1.0	2.5	2.0	2.5	2.5	2.5
CO3	3.0	1.0	1.0	1.0	2.0	2.0	1.0
Average	2.8	1.3	2.1	1.6	2.1	1.8	1.5

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 203-A: Hygiene

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3.0	2.0	1.0	1.0
CO2	2.0	1.0	2.0	1.0
CO3	2.0	2.0	2.0	1.0
Average	2.3	1.6	1.6	1.0

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC6: Nutritional Biochemistry

Course No.: HS 203-B **MM: 60+15=75**

Time allowed: 3 Hrs.

Course Credit: 3

Instructions for the Examiner:

The examiner will set nine questions in all, selecting four questions from each unit and one compulsory objective type question.

Instructions for the Candidates:

The candidate will attempt five questions in all, selecting two questions from each unit and one compulsory question.

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To enable the students to learn the concepts of biochemistry.
2. **CO2:** To analysis various problems in relation to human nutrition.
3. **CO3:** To acquire knowledge about nutrition, health and disease.
4. **CO4:** To equip the students with the appropriate tool for analysis in field of biochemistry.

UNIT-I

1. Nutrients in food- Definition, classification, structure, general properties, digestion, absorption and metabolism of Carbohydrates, Proteins, Nucleic acids, Lipids (including iodine number, Acid value and Saponification value).
2. Hormones: Chemical classes, mechanism of actions of hormones.

UNIT-II

1. Chemistry, physiological importance of fat soluble vitamins (A, D, E and K) and water soluble vitamins- B1, B2, B6, B12 niacin, folic acid and vitamin C.
2. Biological role of Macro minerals (calcium, magnesium, phosphorus, sodium, potassium) and micro minerals (Iron, iodine, fluorine, zinc, copper, selenium, cobalt).

3. Enzymes- Definition, chemical nature, classification, importance and factors affecting enzyme activity. Co-factor, co-enzyme.

REFERENCES:

1. Pant, M.C. (latest edition): Essentials of Biochemistry, Kedar Nath, Ram Nath & Co.
2. Conn. E.E. & Stumfp P.K. (latest edition)
3. Outlines of Biochemistry, Wiley Eastern Pvt. Ltd.
4. Principles of Biochemistry by J.L. Jain
5. Principles of Biochemistry by Leherninger
6. Practical Biochemistry by David T Plummer

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 203-B: Nutritional Biochemistry

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2.5	3	2.5	3
CO2	3	3	2.5	2.5	3	3	3
CO3	3	3	2.5	2	3	3	3
CO4	3	2.5	3	3	2.5	2.5	3
Average	3	2.8	2.5	2.5	2.8	2.7	3

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 203-B: Nutritional Biochemistry

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2.5
CO2	2	2.5	3	2.5
CO3	3	2	3	2
CO4	1.5	2	3	2.5
Average	2.3	2.1	3	2.3

PRACTICAL
Nutritional Biochemistry

MM: 25
Time allowed: 3 Hrs.
Course Credit- 1

Course Outcomes: The course learning outcomes for practical of this course are-

1. **CO1:** To obtain knowledge about preparation of various solutions used in Qualitative biochemical analysis.
2. **CO2:** To analyse the samples qualitatively for presence of biomolecules (carbohydrates, proteins and lipids) and estimation of Vitamin C, chloride.

Syllabus:

1. Preparation of solutions of different concentrations and expressing concentrations in different units.
2. Preparation of buffer solution (Acetate buffer-0.2 Molar, pH-10.2).
3. Qualitative analysis of different Carbohydrates, Protein and Lipids.
4. Determination of Vitamin C by titrimetric method and fat (demonstration by Soxhlet apparatus) in different food stuff.
5. Determination of saponification value and acid value of two different fats or oils.
6. Develop a chromatogram of known amino acids and mixture of amino acids by 2-D paper chromatography.
7. Estimation of chloride in table salt by titrimetric method.

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 203-B (Practical): Nutritional Biochemistry

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2.5	2	2.5
CO2	3	2	2.5	2	3	2	2.5
Average	3	2	2.7	2	2.7	2	2.5

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 203-B (Practical): Nutritional Biochemistry

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1.5	3	2
CO2	3	1.5	2.5	2
Average	3	1.5	2.7	2

B.Sc. (HOME SCIENCE)
SEMESTER – II
CC-6: Introductory Bakery (Practical)

Course No.: HS 203-C **MM: 50**

Time allowed: 3 Hrs.

Course Credit: 2

Course Outcomes: The course learning outcomes for this course are-

1. **CO1:** To understand the basic concept and importance of baking.
2. **CO2:** To give the knowledge of various baking equipment used in bakery science.
3. **CO3:** To learn the skill in preparation of various baked products.
4. **CO4:** To get practical knowledge of bakery unit.

Syllabus:

1. Study of various types of bakery equipment
2. Type of baking ingredients: flour, yeast, salt, egg, type of fat etc. and their uses
3. Preparation of various types of bakery products: Cake, pastry, biscuit, muffin, cookies, buns
4. Calculation of nutritional value of each recipe
5. Visit to bakery unit

Mapping of Course Outcomes with Program Outcomes (CO/PO)
Paper No. HS 203-C: Introductory Bakery

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2.5	2.5	3	2	2
CO2	3	3	3	3	3	1	2
CO3	2	3	3	3	3	2	3
CO4	2	3	3	2.5	3	3	3
Average	2.2	3	2.8	2.7	3	2	2.5

Mapping of Course Outcomes to Program Specific Outcomes (CO/PSO)
Paper No. HS 203-C: Introductory Bakery

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	2.5	1	2	1
CO2	3	2	3	3
CO3	3	2	3	3
CO4	3	2	3	3
Average	2.8	1.7	2.7	2.5

B.Sc. (HOME SCIENCE)
SEMESTER – II
AECC-2: Environment Studies / Functional English

Course No.: EVS/ ENG 100 **MM: 50**

Time allowed: 3 Hrs.

Course Credit: 4

Kurukshetra University, Kurukshetra

Department of Geophysics

Scheme of Examinations and Syllabus of
M. Sc. (Tech.) Applied Geophysics I to VI Semester
Under CBCS-LOCF
(w.e.f. session 2020-2021)
in phased manner

Vision and Mission of Kurukshetra University

Vision

Be globally acknowledged as a distinguished centre of academic excellence.

Mission

To prepare a class of proficient scholars and professionals with ingrained human values and commitment to expand the frontiers of knowledge for the advancement of society.

Introduction

The sustainable development of society needs energy resources, clean drinking water, safety, advanced technologies and clean Earth environment. Geophysics is the study of physical processes of Earth and its surrounding space. It is a multidisciplinary subject with applications from Physics, Geology, Computer Science, Electronics etc. The interior of Earth can only be studied by indirect methods like propagation of seismic wave. The study of different phases from Earth provides constraints which are used to interpret physical properties of Crust, Mantle, Outer Core and Inner Core. The Earth processes are studied to know about origin of the Earth. The geophysics applications include Oil & Gas exploration, Ground Water exploration, Archaeological studies, Environmental studies, Seismic Hazard, Mineral explorations, Civil engineering, Geotechnical etc. The outer space applications include study of moonquakes, gravity field and magnetic field.

Vision and Mission of the Department of Geophysics

Vision

Be recognized as distinguished department in the Geophysical World for learning and research in Applied Geophysics.

Mission

To prepare the professionals in the broad spectrum of Applied Geophysics e.g. earthquake hazards, hydrocarbon exploration, tectonics, mineral and ground water resources etc. to serve the society.

Programme Outcomes (PO) of Post Graduate Science CBCS Programmes/Courses in the Faculty of Sciences, Kurukshetra University, Kurukshetra

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge one has gained during course of study
PO2	Research Aptitude	Develop research aptitude. Capability for asking relevant/appropriate questions. Capable of identifying, formulating and analyzing the research problems and to draw conclusions from analysis of research problems.
PO3	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large.
PO4	Problem Solving	Capability of applying knowledge to solve scientific and other problems.
PO5	Individual and Team Work	Capable to learn and work effectively as an individual and as a member or leader in team(s) and in multidisciplinary settings. Facilitate cooperative or coordinated efforts on the part of a group and act together as a group or as a team.
PO6	Investigation of Problems	Ability of critical thinking and analytical reasoning. Ability to use disciplinary and research based knowledge including design of experiments, analysis and interpretation of data to provide valid conclusions.
PO7	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices.
PO8	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices.
PO9	Life-Long Learning	Ability to acquire knowledge and skills including learning 'How to learn' that are necessary for participating in learning activities throughout life.
PO10	Ethics	Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism and adopting objective, unbiased and truthful actions in all aspects of work.
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these as a member / leader of a team to manage projects

Programme Specific Outcomes (PSOs) for M.Sc. (Tech.) Applied Geophysics

PSO1: Understand the interior of Earth using latest Geophysical knowledge pertaining to various sub-fields within the discipline of Applied Geophysics.

PSO2: Inculcating analytical ability, research aptitude and relevant skills in the students useful for their professional life.

PSO3: Ability to demonstrate and communicate Geophysical knowledge, understanding of Geophysical techniques/principles and apply the same to solve geophysical problems relevant to society.

PSO4: Learning the techniques of data acquisition, data processing and data interpretation for Geophysical methods and their applications for the benefit of society.

DEPARTMENT OF GEOPHYSICS KURUKSHETRA UNIVERSITY KURUKSHETRA

SCHEME OF EXAMINATION, TEACHING LOAD AND SYLLABUS OF
M.Sc. (Tech) Applied Geophysics

FIRST SEMESTER EFFECTIVE FROM THE SESSION 2020-21:

S.No.	Course no. & Course	Teaching Load (hrs/week/group) L	T	P	Marks Distribution Th/P	CW	Total	Credit	Duration of Exam (Hours)
1.	GP-101: Mathematical Methods in Geophysics	4	½	0	60	40	100	4	3
2.	GP-102: Solid Earth Geophysics	4	½	0	60	40	100	4	3
3.	GP-103: Numerical Methods & Computer Programming	4	½	0	60	40	100	4	3
4.	GP-104: Basic Geology	4	½	0	60	40	100	4	3
5.	GP-105: Geology Lab	0	0	12	90	60	150	6	4
6.	GP-106: Computer Lab	0	0	12	90	60	150	6	4
	Semester Total	16	2	24			700	28	

SECOND SEMESTER EFFECTIVE FROM THE SESSION 2020-21:

S.No.	Course no. & Course	Teaching Load (hrs/week/group) L	T	P	Marks Distribution Th/P	CW	Total	Credit	Duration of Exam (Hours)
1.	GP-201: Remote Sensing & GIS	4	½	0	60	40	100	4	3
2.	GP-202: Advanced Computing	4	½	0	60	40	100	4	3
3.	GP-203: Geophysical Signal Processing	4	½	0	60	40	100	4	3
4.	GP-204: Geophysical Fields & Waves	4	½	0	60	40	100	4	3
5.	GP-205: Geophysical Lab - I	0	0	12	90	60	150	6	4
6.	GP-206: Geophysical Lab - II	0	0	12	90	60	150	6	4
7.	GP-207: Geological Field Training	4 hrs/week*					100	4	30 min. per student
8.	OE-206: Dynamics of the Earth@	2	0	0	35	15	50	2	2
9.	OEL-I Open Elective paper**	-		-	-	-	-		
	Semester Total	18	2	24			850	34	

THIRD SEMESTER EFFECTIVE FROM THE SESSION 2021-22:

S.No.	Course no. & Course	Teaching Load (hrs/week/group) L	T	P	Marks Distribution Th/P	CW	Total	Credit	Duration of Exam (Hours)
1.	GP-301: Seismology	4	½	0	60	40	100	4	3
2.	GP-302: Gravity & Magnetic Prospecting	4	½	0	60	40	100	4	3
3.	GP-303: Groundwater Geophysics	4	½	0	60	40	100	4	3
4.	GP-304: Electrical Prospecting	4	½	0	60	40	100	4	3
5.	GP-305: Geophysical Lab-III	0	0	12	90	60	150	6	4
6.	GP-306: Geophysical Lab-IV	0	0	12	90	60	150	6	4
7.	OE-306 Earthquake Hazard and Mitigation @	2	0	0	35	15	50	2	2
8.	OEL-II: Open Elective paper**	-		-	-	-	-	-	-
	Semester Total	18	2	24			750	30	

FOURTH SEMESTER EFFECTIVE FROM THE SESSION 2021-22:

S.No.	Course no. & Course	Teaching Load (hrs/week/group) L	T	P	Marks Distribution Th/P	CW	Total	Credit	Duration of Exam (Hours)
1.	GP-401: Petrophysics & Well Logging	4	½	0	60	40	100	4	3
2.	GP-402: Physical Oceanography & Marine Geophysics	4	½	0	60	40	100	4	3
3.	GP-403: Seismic Prospecting	4	½	0	60	40	100	4	3
4.	GP-404: Geophysical Inversion	4	½	0	60	40	100	4	3
5.	GP-405: Geophysical Lab – V	0	0	12	90	60	150	6	4
6.	GP-406: Geophysical Lab - VI	0	0	12	90	60	150	6	4
7.	GP-407: Geophysical Field Training-I	4 hrs/week*					100	4	30 Min. per student
	Semester Total	16	2	24			800	32	

FIFTH SEMESTER EFFECTIVE FROM THE SESSION 2022-23:

S.No.	Course no. & Course	Teaching Load (hrs/week/group) L	T	P	Marks Distribution Th/P	CW	Total	Credit	Duration of Exam (Hours)
1.	GP-501: Near Surface Geophysics	4	½	0	60	40	100	4	3
2.	GP-502: Electromagnetic and Magenotelluric Methods	4	½	0	60	40	100	4	3
3.	GP-503: Geophysical Lab-VII	0	0	12	90	60	150	6	4
4.	GP-504: Geophysical Lab-VIII	0	0	12	90	60	150	6	4
5.	GP- Elective – I	4	½	0	60	40	100	4	3
6.	GP- Elective – II	4	½	0	60	40	100	4	3
	Semester Total	16	2	24			700	28	

SIXTH SEMESTER EFFECTIVE FROM THE SESSION 2022-23:

S.No.	Course no.& Course	Th/P	CW	Marks Distribution Total	Credit	Duration of Exam Hours
1.	GP-601: Dissertation	4 hrs/week*		400	16	30 min. per student
2.	GP- 602: Comprehensive Viva-Voce			100	4	30 min. per student
3.	GP- 603: Seminar	1 hr/week*		100	4	01 Hour per student
4.	GP-604: Geophysical Field Training-II	4hrs/week*		100	4	30 min. per student
	Semester Total			700	28	

@For the students of other departments of the university.

*Credited to the teacher(s) associated with Field training/dissertation work/seminar of the students

**Students have to opt one course each in second and third semester to be offered by other departments of the university or these courses can be opted though MOOCS/Swayam. However, students can opt for summer/industrial training in lieu of open elective course of 3rd semester. This training can be done in the summer vacation falling in the period intervening between second and third semester and as per university guidelines.

Elective – I Solid Earth

GP-506: Computational Seismology
GP-507: Geomagnetism
GP-508: Whole Earth Dynamics
GP-509: Solid Mechanics
GP-510: Numerical Simulation of Earth System
GP-511: Non-linear Geophysics

Elective – II

GP-512: Geotomography
GP-513: Seismic Data Analysis & Reservoir Geophysics
GP-514: Reservoir Modelling
GP-515: Radiometric Exploration
GP-516: Advanced Remote Sensing & Image Processing
GP-517: Artificial Intelligence & Machine Learning in Geophysics

GP-101: Mathematical Methods in Geophysics

Max. Marks: 60

Credits: 4 Time: 3 hours

Course Outcomes:

After completion of this course, the students will be able to:

CO101.1: Learn the concept of different mathematical special functions for the solution of geophysical problems.

CO101.2: Understand the concept of complex variables and different series for the application in geophysics

CO101.3: Learn the basics of Laplace and Fourier transforms and its application in geophysics.

CO101.4: Learn different kinds of partial different equations and its solutions.

Special Notes:

Nine questions will be set and students will attempt five questions. Question no. 1 will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. 1, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Special Functions

Power series method to solve partial differential equations Legendre Function: Legendre differential equation and its solution, recurrence relation, Legendre functions, Rodrigue's formula, Associated Legendre functions and its recurrence relations and orthogonality property Bessel Functions: Bessel differential equation and its first and second solutions, Bessel functions, Recurrence relations, Orthogonality, Modified Bessel function, Spherical Bessel functions Applications of Legendre and Bessel functions in Geophysics

Unit-II: Complex Variables

Complex variable, limit, continuity and differentiability of function of complex variables, analytic functions, Cauchy Reimann's equations, Cauchy's integral theorem, Morera's theorem, Cauchy integral formula, Expansion by Taylors and Laurents series, singularities, Residue theorem, contour integration Applications in Geophysics

Unit-III: Integral Transforms

Fourier series, evaluation of coefficients of Fourier series, sine and cosine series, complex form of Fourier series, Dirichlet condition, integration and differentiation of Fourier series, Parseval theorem for Fourier series, Fourier sine and cosine integral Concept of integral transform, Laplace Transform (L.T): definition, properties, L.T. of periodic function, multiplication and division with L.T., L.T. of error function, L.T. of Bessel function, Inverse Laplace Transform. Fourier transform (F.T.): Definition, properties, Parseval theorem for F.T., Modulation, Conjugate and Convolution Theorem, Derivative of F.T., Inverse Fourier transform, application of Fourier transform in solving differential equations. Applications in Geophysics

Unit-IV: Partial Differential Equations (P.D.E.)

Solution by separation of variables of

(a) Wave equation: Transverse vibrations of a stretched string; Oscillations of a hanging chain, vibrations of rectangular and circular membranes, tidal waves in a canal.

(b) Laplace's equation: Laplace equation in Cartesian, Cylindrical and spherical coordinate systems, two dimensional steady flow of heat, General cylindrical and spherical harmonics.

(c) Diffusion equation: Variable linear heat flow, periodic heat flow in one dimension, two dimensional heat conduction.

RECOMMENDED BOOKS

(1) Applied Mathematics for Engineers and Physicists by L .Pipes & L.R. Horwell

(2) Mathematical Methods for Physicists by G. Arfken

(3) Mathematical Physics by B.S. Rajput
(4)Elementary Applied Partial Differential Equations: With Fourier series and Boundary Value Problems by Richard Haberman
(5) Integral Transforms by I. Sneddon
(6) Elements of Partial Differential Equations by I. Sneddon

GP-102: Solid Earth Geophysics

Max. Marks: 60
Credits: 4 Time: 3 hours

Course Outcomes:

After completion of this course, the students will be able to:

CO102.1: Understand the basics of geophysics and origin of solar system as well as to develop concept of different theories for the evolution of earth

CO102.2: learn different radiometric dating techniques and to develop concept of gravity and its essential features.

CO102.3: Develop concept on magnetic properties of the earth and heat flow inside the earth.

CO102.4: Understand earthquake seismology, internal structure of the earth and mountain building

Special Notes:

Nine questions will be set and students will attempt five questions. Question no. 1 will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. 1, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Origin of the Solar System and Earth

A brief history of the development of Earth Sciences and of Geophysics in particular, an overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure, Kepler's law of planetary motion, A review of the Earth's structure and composition

Unit-II: Rheology, Radiometric Dating and Gravity of the Earth

Chemical composition of Earth, Rheological behaviour of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy.

Unit-III: The Earth's magnetic field

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle.

Unit-IV: Earthquake Seismology and Interior of the Earth

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its historical perspective and essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, trenches and island arcs, hot spots, Mantle Plume, Mountain building, origin, structure and subdivision of Himalaya, Geodynamics of Indian subcontinent.

RECOMMENDED BOOKS:

(1) The Solid Earth by C.M.R. Fowler
(2) Understanding the Earth by I.G. Guass, P.S. Smith and R.G.L. Wilson
(3) The dynamic Earth by P.J. Wyllie
(4) Introduction to Geophysics by B.F. Howell
(5) Physics and Geology by J.J. Jacobs, R.D. Russel and J.T. Klilson
(6) Fundamental of Geodynamics by A.E. Schieddeggar
(7) Fundamentals of Geophysics by W. Lowrie

GP-103: Numerical Methods And Computer Programming

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO103.1: Learning about the problem solving approach and different operating systems used for computer programming to be used in processing.

CO103.2: Learning and acquiring knowledge of FORTRAN and its functions used for developing the codes used for processing and interpretation of geophysical problems.

CO103.3: Acquiring knowledge of C along with its functions for the development of programs.

CO103.4: Developing ability to make codes/ programs with problem solving approach towards various geophysical problem and numerical methods to be used in data processing and interpretation in geophysics.

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction

Introduction- Computer organization, Functional Units, basic I/O devices and storage media, computer software, computer languages, Problem Solving Approaches: Notion of an algorithm, stepwise methodology of developing algorithm, flowchart and computer program, introduction to computer operating systems: DOS, WINDOWS, UNIX/LINUX.

Unit-II: Basics of FORTRAN

Introduction to FORTRAN, constants, variables, data types, operations and intrinsic function, expression and assignments statements, Logical operators and Logical expressions, iterative statements, input/output statements, subroutine and functions, data sharing among subprograms/programs, Arrays, operations with files, programming examples to handle problems of numerical and statistical type.

Unit-III: Learning C

Introduction: Variables, Constants, Functions, Arguments, Character Arrays; Statements, Arrays, Functions; Data Types, Operators and Expressions; Control Flow: Statements, If-Else, Else-If, Switch, Loops-While and For, Break and Continue, Goto; Functions and Program Structure: Basics, Header files, Static Variables; Pointers and Arrays; Structures: Basics, Array of Structures, Pointers to Structures; Input and Output: Scanf, Printf, Line Input and Output.

Unit-IV: Programming in FORTRAN

Numerical integration by Simpson's method, Trapezoidal method, Numerical differentiation, solution of algebraic equation, Newton Raphson method, solution of simultaneous linear equations, Gauss method, Gauss-Jordon method, Gauss-Seidel method, matrix inversion, least square curve fitting, straight line and polynomial fits, solution of ordinary differential equations.

A brief introduction of Binomial, Poisson and normal distributions, concept of mathematical expectations

RECOMMENDED BOOKS

(1) Fundamentals of computers by V. Rajaraman

(2) FORTRAN 77 and Numerical methods by C. Xavier

(3) FORTRAN Programming and Numerical methods by R.C. Desai

(4) Let us C by Yashwant Kanetkar
(5) The C programming language by Brian W. Kernighan and Dennis Ritchie
(6) Advanced UNIX- A Programmers guide by Stephen Prata

GP-104: Basic Geology

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO104.1: understand basic concept of geology and different geological process responsible for landforms.
CO104.2: familiarize with minerals and their identification and occurrence in the earth.
CO104.3: Gain basic knowledge of rocks, their process of formation and occurrence in the earth.
CO104.4: Gain knowledge of different geological structures associated with deformation processes

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit–I: Introduction of Geology

Introduction to geology, Geomorphological Processes: Exogenic processes, Geologic time-scale and age of the Earth, Geological processes by river, wind, glacier and waves and tides. Principle of stratigraphy, elements of stratigraphic classification, physical and structural sub-disciplines of Indian subcontinent and their characteristics, An outline of the geology of India with respect to distribution, classification, lithology and economic importance of the following: Archean, Dharwar, Cuddapah, Vindhyan, Gondwana.

Unit–II: Mineralogy

Mineral – its definition and mode of occurrence, physical properties of minerals like form, colour, lustre, streak, cleavage, fracture, hardness and specific gravity, radioactivity, isotopes and ions, Physical characters and chemical composition of the rock forming minerals, mode of occurrence and economic uses of some important rock forming minerals.

Unit–III: Petrology

Rock- its definition, classification and distinguishing characteristics of Igneous, Sedimentary and Metamorphic rocks. Igneous rocks: Magma and lava, extrusive and intrusive forms, textures; Classification and description of some common igneous rocks (Granite, Dolerite, Basalt, Rhyolite, Pegmatite). Sedimentary rocks: Sedimentation processes; Classification and description of some common sedimentary rocks (Conglomerate, Sandstone, Shale, Limestone). Metamorphic rocks: Processes of metamorphism, textures and structures of metamorphic rocks; Classification and description of some common metamorphic rocks (Slate, Schist, Gneiss, Quartzite, Marble). Indian distribution of major rock types.

Unit–IV: Structural Geology

Primary and secondary structures of rock, Dip, strike, bearing and azimuth, Outcrops, outliers and inliers, Folds: definition and classification scheme, mechanism of folding, recognisation of folds in the field. Fault: definition and different terminology of fault, mechanism of faulting, recognisation of fault in the field, shear zone, lineament. Joints: definition, types of joint. Unconformity: concepts, types, recognisation and significance of unconformities. Clinometer compass and its use.

RECOMMENDED BOOKS:

(1) Rutley's Elements of Mineralogy By H.H. Read
(2) Structural Geology by M.P. Billings
(3) Principles of Physical Geology by A.H. Holmes

(4) A Text Book of Geology by P.K. Mukherjee
(5) The Principles of Petrology by G.W. Tyrrell
(6) Manual of Field Geology by R.R Compton
(7) An introduction to structural geology by A.K. Jain
(8) Structural Geology by Haakon Fossen

GP-105: Geology Lab

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO105.1: develop practical knowledge of minerals, rocks and landforms,
CO105.2: learn effective ccommunication, presentation and understanding of geological knowledge.
CO105.3: know the use of toposheet, bruntone/clinometer in geology
CO105.4: learn to interpret and construct of geological maps and cross section

1. Continental scale land forms of India
2. Physical properties of important rock forming minerals
3. Megascopic study and identification of important igneous, sedimentary and metamorphic rocks
4. Study of Toposheets
5. Uses of bruntone/clinometer and measurement of dip and strike of beds
6. Study of geological map and construction of cross section of area comprising of horizontal, unconformable, inclined, folded and faulted rocks.

GP-106: Computer lab

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO106.1: Acquaintance with the different computer operating systems.
CO106.2: Learn to run or operate the exercises using computer software's.
CO106.3: Learn to write codes/programs in Fortran and simple exercise in C.
CO106.4: Able to tackle the coding on computational problems and their solution on computers.

(1) Exposure to computer operating system : DOS, WINDOWS, UNIX/LINUX

(2) Simple exercises based on available computer softwares

(3) Programming exercises on computational problems and their solution on computers. These include the following:

(i) Matrix operations

(ii) Matrix inversion

(iii) Numerical integration

(iv) Solution of simultaneous equations

(v) Linear curve fitting

(vi) Correlation coefficient, standard deviation etc.

(vii) Numerical differentiation

(viii) Solution of differential equation

(ix) Solution of transcendental and algebraic equation using Newton Raphson method

GP-201: Remote Sensing and GIS

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:

After the completion of the course, the students will be able:

CO201.1: To understand the basic concepts of remote sensing and Aerial Photogrammetry including physical basis and photo-characteristics of various rock types etc.

CO201.2: To gain knowledge about Remote sensing sensors, satellite programmes, basic image interpretation, visual interpretation and digital image analysis.

CO201.3: To gain the knowledge about GIS and its components, GPS and its segments, creation of thematic layers, raster and vector data.

CO201.4: understand image interpretation and methodology for preparation of various thematic maps and applications of RS & GIS.

Special Notes:

(i) Nine questions will be set and the students will attempt five questions. Question No.1 will be compulsory and based on the conceptual aspects of the whole syllabus. It can have five to ten parts. Answers should not be in yes/no. In addition to question No. 1, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction to Remote Sensing and Aerial Photography

Definition, Principle and Physical basis of Remote Sensing, Electromagnetic (EM) Spectrum, Interaction of EM radiations with earth's surface and atmosphere, Atmospheric Windows, spectral signatures, remote sensing platforms, Concept of Photogrammetry, aerial photographs, types of aerial photographs, Information recorded on aerial photographs, stereoscopy, stereoscopic parallax, measurement of height difference, vertical exaggeration, elements of photo-interpretation, geotechnical elements, photo-characteristics of different rock types, photo-mosaic, image distortion and rectification.

Unit-II: Sensor and Image Interpretation

Remote Sensing Sensors: active and passive sensors, Satellite Imagery: Imagery vis a vis aerial photograph, MSS, LISS, CCD, Infrared and thermal scanners, IRS, SPOT and LANDSAT satellite programmes, microwave remote sensing: RADAR, LIDAR etc, remote sensing data products, resolutions in remote sensing, multispectral, super-spectral and hyper-spectral remote sensing, fundamentals of image interpretations and analysis, visual interpretation of remote sensing data; colour composites, concept of digital image and pixels, image restoration, image enhancement and information extraction, supervised and unsupervised classification; accuracy assessment in remote sensing

Unit-III: GIS and GNSS

Introduction to Geographical Information System (GIS), components of GIS, functions of GIS, data structures, Concept of raster and vector data, digitization, editing, attribute attachment etc, creation of thematic layers, Data Integration, vector to raster conversion and vice–versa. Introduction to Global Position System (GPS), various segments of GPS, Uses of GPS, GNSS.

Unit-IV: Applications

Applications of Remote Sensing and GIS: image interpretation for identification of different rock types, structures, lineaments and preparation of geological map; recognition of landforms and preparation of geomorphological map; drainage pattern and its significance; ground water prospects mapping, integrated ground water resources (IGWR) mapping, landslide hazard zonation, route alignment for road/ canal, Hydrocarbon and minerals exploration, Disaster management (flood and cyclones)

Recommended Books:

1. Remote Sensing Geology (Springer Verlag). R.P. Gupta
2. Remote Sensing in Geology (John Wiley & sons). B.S. Siegel and A.R. Gillespie
3. Remote Sensing and image interpretation (John Wiley & sons). T.M. Lillesand and R.W. Kiefer
4. Remote Sensing Principles and interpretation (WH Freeman Company. F.F. Reeds
5. Remote Sensing fro Earth Resources (AEG publication), D.P. Rao
6. Principles of Remote sensing (ELBS London). P. J. Kuran
7. Advances in Geophysics Vol. 1 and 13 (Academic press) H.E. Landesberg
8. Handbook of Information issued by GSI (Airborne Mineral surveys and exploration wing), AEC (Atomic Minerals Divisions) and NGRI.
9. Principles of GIS, P. A. Burrough
10. Indian Society of GeomaticsNews letters 2004-2005
11. GPS: Theory and Practice (Springer Verlag). B. Hofman-wellenhof, H.lichtenegger and J.Collins

GP-202 Advanced Computing

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO202.1:.learn basics of programming and C++
CO202.2: understand simple concepts of programming in C++.
CO202.3: gain knowledge of advanced concepts of programming in C++.
CO202.4: understand concepts of programming in MatLab and GMT.

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction to C++ programming

Brief history of C++, Basics of a C++ program; Command Line Compiler, Integrated Development Environment (IDE); Declarations and Expressions: Program Structure, Variable Storage and Declarations, Assignment statements, Characters; Programming Examples.

Unit-II: Simple Programming in C++

Arrays, Reading Data, Strings, Integers and Floats; Hexadecimal and Octal Constants; Decision and Control Statements: if, while, for, Break and continue- Statements; Makefile, Testing and Debugging; Variable: Scope and Functions: Basics of Structured Programming; Programming Examples.

Unit-III: Advanced Programming in C++

Structures and Array of Structures; File Input/Output: C++ File I/O, Binary and ASCII files, Buffering; Debugging and Optimization: Serial Debugging, Runtime Errors; Floating Point: Format, Roundoff Errors; Pointers: Pointers and Structure; Classes: Derived and Virtual Classes, Virtual Functions; Exceptions; Modular Programming.

Unit-IV MatLab and Generic Mapping Tools

Introduction to MatLab; Formats, Variables: Declaration; Characters; Strings; Functions; Control Statements; Vectors; Script file; Vector calculations, Matrix and its operations; Solving system of linear equations; m-file; Input/Output data; Graphical User Interface. Introduction to Generic Mapping Tools (GMT): Input, Job Control, Output; Projections; GMT defaults; Examples.

Suggested Books

1. The C++ programming language: Bjarne Stroustrup
2. The C++: The complete reference: Herbert Schildt
3. Object oriented programming C++: Petroleum Geology: Chapman, R.E.
4. Programming in C++: Robert Lafore
5. Programming in MatLab: Marc E. Herniter
6. Generic Mapping tools: Wessel and Smith

GP-203: Geophysical Signal Processing

Max. Marks: 60
Credits: 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO203.1: Understand the basic concepts of signal and system theory.
CO203.2: Understand the concept of discrete transforms and their applications in geophysics.
CO203.3: Analyze the time series using the concepts of geophysical signal processing.
CO203.4: Design and apply the filters to the geophysical signals.

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Signal and System

Signals: Various special signal and classification of signals, orthogonal function, band limited signals, sampling theorem, aliasing effect of sampling on reconstruction of continuous signal from their samples, extrapolation of band limited signals

Systems: Classification of Systems, Linear time invariant causal and stable system with continuous and discrete input, minimum phase signals, Hilbert transform

Unit-II: Discrete Transform

Z transform, properties of Z transform, and the region of convergence, Z transform of causal and non causal sequence, inverse Z transform, Transfer function, Solutions of difference equation using Z-transform, Relation between S-plane and Z-plane

Review of Fourier Transform, Introduction to wavelet transform and Walsh transform and their application in geophysics

Discrete Fourier transform (DFT), relation between DFT and Z transform, Fast Fourier Transform (FFT), Decimation in time(DIT) and Decimation in frequency (DIF) algorithms, applications of FFT in geophysics, deconvolution, circular convolution, Importance of Windowing, Commonly used windows, cepstral analysis

Unit-III: Time series analysis

Introduction of stochastic process, autocorrelation and cross correlation, Stationarity, Wide sense stationarity, ergodicity, power spectral density function, Wiener Khinchine theorem, White Gaussian Noise, Wiener Filtering, Matched Filtering

Unit-IV: Filters and System Realization

Recursive and non-recursive filters, ideal and realizable low pass, band pass and high pass filters, IIR filters, Design of Butterworth filters, Design of FIR filters using direct and canonical realization scheme, Cascade and parallel realization scheme.

Recommended Books

1. Signal and Systems, M.L. Meade and C.R.Dillon , Chapman and Hall London
2. Digital Signal Processing, 1975, Oppenheim, A.V. and R.W. Schafer, Prentice Hall, Englewood Cliffs, New Jersey
3. An Introduction to Statistical Communication Theory, J. B. Thomas, John Wiley, New York
4. Spectral Analysis in Geophysics, 1974, Markus Bath, Elsevier, Amsterdam
5. Signal Analysis, 1977, A. Popoulis, McGraw Hill New York

GP-204: Geophysical Fields and Waves

Max. Marks 60

Credits : 4 Time 3 Hrs

Course Outcomes:

On completion of this course, the students will be able to

CO204.1: Understand the basic concepts about the different types of Geophysical fields and associated laws.
CO204.2: Understand the basic of heat conduction processes in the earth and its applications.
CO204.3: Understand the basic of wave theory and fundamentals of electromagnetics theory.
CO204.4: Understand the basic of Electromagnetic methods.

Special Notes:

Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit–I: Potential Field Theory:

Introduction to Geophysical fields; Inverse square law of field: Gravity, Magnetostatic and electrostatic, Green's theorem and Green's functions, Potential due to an arbitrary source distribution, continuation of potential fields, Dirichlet and Neumann problems.

Unit-II: Thermal Conduction in Earth

Heat conduction equation; effect of advection; time scale of conductive heat flow;calculation of simple geotherms in continents; Geological applications of heat conduction in semi-infinite half space: (i) penetration of external heat into the earth due to periodic variation of surface temperature, (ii) instantaneous heating or cooling of semi-infinite half space and its application to cooling of oceanic lithosphere and (iii) thermal and subsidence history of sedimentary basins, Age of Earth on the basis of cooling.

Unit-III: Wave Theory

Introductory remarks about seismic and electromagnetic waves, Elastic Waves: Analysis of stress and strain, properties of equilibrium and motion in terms of stresses/displacements for infinitesimal and finite deformation, Generalised Hook's Law, Isotropy and Anelasticity.

Electromagnetic Waves: Maxwell's equations, constitutive relations, Plane electromagnetic waves in dielectric and conductor.

Unit-IV: Electromagnetic method

Principles of EM prospecting, various EM methods, passive source and active source methods, theory of EM induction; elliptical polarization, Airborne electromagnetic survey. Telluric methods: Theory of telluric method, field procedure and method of measurement, analysis of telluric field data, Magnetotelluric method, processing and interpretation of MT data.

Books Recommended

1. Geodynamics applications of continuum Physics to geological problems : Turcotte & Schubert
2. Interpretation theory in Applied Geophysics: F.S. Grant & G.F. West
3. Electromagnetic theory: J. Stratton
4. Heat conduction: I.R. Ingersoll
5. Solid Earth: C.F. Fowler
6. Fundamentals of Geophysics: W. Lowrie
7. Introduction to theoretical Geophysics: C.B. Officer
8. Geophysical Electromagnetic Theory and Methods: Michael S. Zhdanov,

GP-205: Geophysical Lab-I

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:
After the completion of the course, the students will be able
CO205.1: To write advanced programs in C++.
CO205.2: To write programs in Matlab and make plots in GMT.
CO205.3: To identify linear features using satellite images, prepare drainage map, land use map.
CO205.4: To prepare geomorphology and hydrogeomorphology map.

Section – A

1. Exercise based on basic concepts in C++.
2. Exercise based on if/while/for/Break/continue Statements in C++.
3. Exercise based on Data Structure in C++.
4. Exercises based on Pointers in C++.
5. Exercise based on Modular Programming in C++
6. Getting started with MatLab: Basics.
7. Numerical methods in MatLab.
8. Plotting maps in GMT.

Section – B

1. Preparation of base maps
2. Use of satellite image for identification of linear features.
3. Preparation of land use land cover map
4. Preparation of drainage map
5. Preparation of Geomorphology map
6. Preparation Hydrogeomorphology map
7. Simple exercises on digital image processing

GP-206: Geophysical Lab-II

Max. Marks: 90

Credits : 6 Time: 4 hours

Course Outcomes:

On completion of this course, the students will be able to

CO206.1: Apply convolution, correlation, and autocorrelation in time and frequency domain.
CO206.2: Compute Fast Fourier Transform of a given signal.
CO206.3: Design and apply filters to the geophysical data.
CO206.4: Use signal processing software MatLab in application to time series data.

Exercises based on

(i) Convolution model in the time & frequency domain

(ii) Computation of FFT

(iii) Autocorrelation & Cross correlation

(iv) Inverse filtering

(v) Deconvolution using Z-transform

(vi) Predictive Deconvolution filter

(vii) Exposure to basic signal processing softwares like PITSA & MATLAB

OE-206: Dynamics of the Earth

Max. Marks: 35
Credits : 2 Time: 2 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO206.1: Acquiring knowledge about the solar system and evolution of the earth.

CO206.2: Learn about the gravity and magnetic field of the Earth to enhance the understanding of geophysical knowledge.

Special Notes:

Five questions will be set and students will attempt three questions. Question No. I will be compulsory of 20 marks and based on the conceptual aspects of the whole syllabus. The answers should not be in yes/no. In addition to question no. 1, there will be two units in the question paper each containing two questions of 15 marks each belonging to two units in the syllabus. Students will select one question from each unit.

Unit-I:

Origin and age of the solar system and the Earth, Evolution of Earth from its origin to the present, Continental drift and sea-floor spreading, Plate-tectonic theory and interactions of different types of plate boundaries, Earth's internal and external structure and composition, variation of seismic velocity, density, temperature and pressure from surface to the centre of the Earth. Rheological properties of Earth, evolution, structure and composition of Earth's atmosphere.

Unit-II:

The gravity field of the Earth, shape and size of the Earth, Gravity anomalies, theory of isostasy and its significance in distribution of land and ocean, origin of the Earth's magnetic field, thermal structure of the Earth, global seismicity, characteristics of earthquakes: origin, distribution, causes and results. Interior of the Earth based on seismic waves. Geodynamics of Indian subcontinent, origin and tectonics of the Himalaya.

Recommended Books:

1. Lowrie, W., Fundamentals of Geophysics, 2nd Edition, Cambridge University Press, 2007.
2. Lillie, R. J., Whole Earth Geophysics: An introduction textbook for geologist and geophysicists, Prentice Hall, New Jersey.
3. Davies, G. F., Dynamic Earth: Plates, Plumes and Mantle Convection, Cambridge University Press, 2000.
4. Fowler, C. M. R., The Solid Earth: An introduction to global Geophysics, 2nd Edition, Cambridge, University Press, 2004.
5. Stacey, F. D., and Davis, P., Physics of the Earth, 4th Edition, Cambridge University Press, 2008.
6. Bott, M. H. P., The interior of the Earth, 2nd Edition, Edward Arnold, London, 1982

GP-207: Geological Field Training

Credit : 4

Max Marks : 100
Time: 30 Minutes per student

Course Outcomes:

On completion of this course, the students will be able to

CO207.1:.Understand rocks and structures in their natural environment and their natural relationship to one another.

CO207.2: Gain experience to use different geological field equipments in the field and collecting geological and structural data.

CO207.3: Learn to prepare geological and structural map, their analysis and interpretation.

CO207.4: Learn how to adopt in field work environment and how to work as a team in the field

GP-301: Seismology

Credits : 4 Max. Marks 60
Time 3 Hrs

Course Outcomes:

On completion of this course, the students will be able to

CO301.1: Understand the basic concepts and principles of Seismology to explore interior of earth.

CO301.2: Acquiring knowledge of earth's structure through seismograms to know more about the earth's interior to develop research aptitude.

CO301.3: Learn about the different model to understand the heterogeneous earth and able to communicate the geophysical knowledge.

CO301.4: Learn about the earthquakes and its related parameters for the benefits of the society.

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit–I: Seismic Wave Propagation

Review of basic concepts and relations in elasticity theory, Hook's Law, reflection and transmission of elastic waves at a plane boundary, plane waves, laws of simple reflection and refraction, head waves, total internal reflection, spherical waves, surface and interface waves, Rayleigh waves, Stoneley waves, love waves, dispersion curves, Free oscillations of the earth, toroidal and spheroidal oscillations, normal modes of a homogeneous sphere.

Unit–II: Earth Structure And Location

Travel time table: the ray parameter and seismic rays, time distance curves for local and teleseismic events, Inversion of travel times for earth's structure, the method of Herglotz and Wichert, Preliminary location of earthquakes, refining the locations, review of various types of field observations, salient features of seismograms with description of different seismic phases.

Unit-III: Earthquake Source Process

Uniqueness and reciprocal theorems, Green's tensor for a uniform medium, mathematical models of earthquake source, radiation pattern for P & S waves from a shear fault, the fault plane solutions.

Unit–IV: Earthquake Parameters And Seismic Zoning

Earthquake parameters: Intensity and magnitude scales, seismic moment, relation between parameters, scaling laws, seismic zoning, seismicity, induced seismicity, earthquake prediction, discrimination between earthquakes and explosions. Earthquake Early Warning System.

Recommended Books:

(1) Elementary Seismology: C.F. Richter
(2) Introduction to theory of seismology : K.E. Bullen
(3) Seismology and Plate Tectonics: David Gubbins
(4) Seismic waves and Sources: A. Ben-Menham & S.J. Singh
(5) Modern Global Seismology: Lay & Wallace
(6) Seismology: Shearer

GP-302: Gravity & Magnetic Prospecting

Max. Marks: 60

Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO302.1: Understand the basic concepts and principles of Gravity and Magnetic methods.
CO302.2: Learn the working of different types of gravitymeters and magnetometers.
CO302.3: Plan the gravity and magnetic surveys including airborne and magnetic gradient surveys, corrections applied to gravity and magnetic data.
CO302.4: Interpret the gravity and magnetic data, applications of gravity and magnetic methods in geophysical exploration.

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit – I: Basic Principles

Principles of Gravity and Magnetic methods, concept of Geoid, Spheriod, a review of magnetic field of the Earth, relation between gravity and magnetic potential, variation of gravity with elevation and depth, determination of density, isostasy and gravity, Magnetization of rocks-Dia, Para- and Ferromagnetism, Magnetic susceptibility of rocks and their ranges, Artificial versus natural source Methods.

Unit-II : Instrumentation

Gravity Prospecting Instruments: Absolute versus Relative measurements of Gravity, Pendulum apparatus, stable and unstable gravimeters, calibration of gravimeters, LaCoste-Romberg gravimeter, Worden gravimeter.
Magnetic Prospecting Instruments: Fluxgate magnetometers, Proton precession magnetometers, optical pumping instruments, Schmidt's horizontal and vertical magnetometrs.

UNIT-III: Gravity and Magnetic Surveys:

Gravity survey on land: setting up of a base station, tide and drift corrections, the reduction of gravity data: the latitude adjustment, the elevation adjustment, the excess mass adjustment, terrain correction, Derivation of expressions for Bouguer correction and Terrain correction, Gravity anomalies: Bouguer anomaly, Free air anomaly and Isostatic anomaly, Gravity anomaly and isostasy, Plan of conducting ground magnetic surveys, corrections applied to magnetic data, Airborne magnetic surveys and magnetic gradient surveys.

UNIT-IV: Interpretation

Separation of residual and regional anomalies: Graphical method, direct computation, second derivative method, polynomial fitting method, wavelength filtering, downward continuation, depth rules, gravitational and magnetic attraction of structures with various simple shapes, estimation of anomalous mass, ambiguity in gravity interpretation, model analysis, step model, ribbon model, Applications of gravity and magnetic methods in oil and mineral exploration.

Recommended Books:

(1) Basic Exploration Geophysics: Robinson
(2) Applied Geophysics: Telford et al.
(3) Introduction to Geophysical Prospecting: Dobrin & Saviet
(4) Geophysical prospecting for oil: Nettleton

(5) Introduction to Geophysical Exploration: Keary & Brooks
(6) Gravity and Magnetic methods of prospecting: B.S. Rama Rao & IVR Murthy

GP-303: Groundwater Geophysics

Max. Marks: 60

Credits : 4 Time: 3 hours

Course Outcomes:

After the completion of the course, the students will be able:

CO303.1: To understand the basic concept of Geohydrology, Hydrogeophysics, hydrological cycle, distribution of water etc.

CO303.2: To understand about the hydrological properties of water bearing materials and groundwater flow characteristics.

CO303.3: To understand about the classification of water bearing rocks, groundwater exploration and management, watershed characterization etc.

CO304.4: To apply geological and geophysical methods for groundwater exploration and to learn various groundwater quality parameters.

Special notes:

Nine questions will be set and the students will attempt five questions. Question No.1 will be compulsory and based on the conceptual aspects of the whole syllabus. It can have five to ten parts. Answers should not be in yes/no. In addition to question No. 1, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Concept and Processes

Concept of geohydrology and hydrogeophysics, hydrology in relation to other sciences, hydrosphere, hydrologic cycle, surface and subsurface distribution of water, origin of ground water, springs, hydrometeorology, precipitation, evaporation, evapotranspiration, seepage, infiltration and runoff and methods of measurement

Unit-II: Hydrological Properties

Hydrological properties of water bearing materials: porosity, void ratio, permeability, transmissivity, storativity, specific yield, specific retention, diffusivity, field and laboratory method for determining permeability, movement of ground water and aquifer performance tests, Darcy's Law and its range of validity, theory of groundwater flow under steady and unsteady conditions, determination of transmissivity and storativity by discharge methods.

Unit-III: Aquifers and Well Development

Mode of occurrence of ground water, classification of rocks with respect to their water bearing characteristics, aquifers, Aquiclude, aquitards, classification of aquifers, remote sensing studies for water resources evaluation. groundwater exploration and management, water balance studies, hydrograph analysis, conjunctive and consumptive use of ground water, water well drilling, development of wells, concept of artificial recharge, Watershed characterization and management.

Unit-IV: Geophysical Methods and Groundwater Characterstics

Monitoring the health of groundwater reservoir, Use of IP for groundwater contamination, Groundwater exploration: surface geological and geophysical methods of exploration and subsurface geophysical methods; Hydro-geochemistry: Physical and Chemical characteristics of groundwater, classification of groundwater in respect to domestic, irrigation and industrial use, pollution of groundwater.

Recommended Books:

1. Groundwater hydrology (John Wiley and Sons), David K. Todd
2. Principles of Hydrology, Ward
3. Handbook of Applied Hydrology, V.T. Chow
4. Introduction to groundwater Hydrology, Heath & Trainer

5. Hydrology. O. Meinzer
6. Hydrogeology (John Wiley and Sons). Davis, S.N., Dewiest, J.R.N.
7. Groundwater (Tata McGraw Hill), Tolman, C.F.
8. Groundwater (Wiley Eastern Ltd.) H.M. Raghunath
9. Basic Exploration Geophysics. Robinson
10. Hydrogeophysics (Kluwer Publishers), Y.Rubin and S. Hubbard
11. Karanth: Development, Assessment and Management of Water Resources

GP 304: Electrical Prospecting

Max. Marks: 60

Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO304.1: Learn about the basics of Electrical prospecting.
CO304.2: Understand the Electrode Configurations, Induced Polarization and Self Potential method.
CO304.3: Understand the basics of D.C. Resistivity method, acquisition and processing.
CO304.4: Capable of Interpretation of Electrical resistivity Data.

Special Notes:

Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four-unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction to electrical methods

A rapid review of the method and techniques of electrical prospecting and their classifications. Electrical properties of rocks, electrical properties of rock and their measurement, anisotrophy and its effect on electrical fields. The geoelectric section and geological section. Basic concept on natural electric field.

Unit-II: Induced Polarization and Self Potential method

Electrode configuration, the choice of method and choice of site measurement, presentation of measured data. S.P. Method: Origin of self potential, theoretical and experimental basis of S.P. method, field of polarized conductor, sphere and cylinder, determination of ore body parameter, downward continuation of S.P. data
I.P method: Sources of I.P, Membrane and electrode potential, time domain and frequency domain measurement of IP, chargeability, percent frequency effect and metal factor, dipole theory of I.P., transformation of time domain to frequency domain data

Unit-III: Resistivity Methods

D.C. resistivity method, fundamental laws, different electrode configurations and their geometrical factors, the potential distribution at the surface of horizontally stratified earth, Kernel function and its relation to subsurface parameters, Principle of equivalence, Principle of superposition and Principle of suppression.

Unit-IV: Interpretation of Electrical resistivity Data

Apparent resistivity function, computation of apparent resistivity model curves, vertical electrical sounding and horizontal profiling techniques, Interpretation of resistivity sounding data, Asymptotic method, Complete curve matching, auxillary point method, equivalent curve matching using maxima and minima, Dar Zurruck curve, Direct interpretation method, electrical profiling near a vertical contact, dyke, sphere, application of linear filter theory for resistivity interpretation.

Recommended Books :

1. Electrical method of geophysical prospecting: Keller, G.V. and Frish Knecht,
2. Geosounding principles: Koefoed, O.
3. The application of Kernel functions in neterpretating geoelectrical measurements, Geoexploration monograph series no. 2Gebruder, Brorntraegr, Berlin : Koefoed, O.
4. Direct current geoelectric sounding: Bhattacharya, B.K. and Patra, H.P.
5. Principles of direct current prospecting Gebruder: Kunetz, G.
6. Interpretation theory in applied geophysics, Mg Graw Hill Co. N.York
7. Kaufman and Keller, The Magnetic Sounding Methods: Grant, F.S. and West, G.B.,
8. Geoelectromagnetism: Wait, J.R.,
9. Time varying geoelectric sounding: Patra and Mallick, K.

GP-305: Geophysical Lab-III

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:
On completion of this course, the students will be able to:
CO305.1: Understand the working of earthquake instruments.
CO305.2: Locate the earthquake epicentre and compute fault plane solution from earthquake data.
CO305.3: Learn to use various software for processing the data for ex. SEISAN, MatLab.
CO305.4: Estimate the source parameters, b-value, Poisson probability, and magnitude of earthquakes.

1. Exposure to earthquake instruments available in the department
2. Identification of seismic phases on seismograms
3. Location of epicenters
4. Fault plane Solutions
5. Frequency magnitude analysis of earthquake data
6. Estimation of decay constant (p-value) from aftershocks data
7. Estimation of b-value from earthquake data.
8. Estimation of source parameters of earthquakes.
9. Estimation of magnitudes of earthquake
10. Estimation of Poisson probability for earthquake occurrences
11. Draw isoseismal lines and prepare intensity map from given data.
12. Exposure to seismological soft wares like PITSA, SEISAN etc.

GP-306: Geophysical Lab-IV

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:
On completion of this course, the students will be able to:
CO306.1: Solve geophysical problems based on Gravity, Magnetic and Electrical methods.
CO306.2: Learn acquisition, processing and interpretation of gravity, magnetic and electrical data.
CO306.3: Communicate effectively, demonstrate and understanding of geophysical knowledge.
CO306.4: Tackle the issues of professional geophysical practices.

1. Exposure to the electrical, magnetic and gravity instruments available in the department
2. Interpretation of VES data using partial curve matching, computer programs and filtering techniques
3. Preparing electrical sections and correlation with lithological logs
4. Reduction of gravity data, Applications of drift correction, Free air correction, Bouguer correction.
5. Calculation of Free Air Anomalies & Bouguer anomalies and their interpretation
6. Estimation of Bouguer density using Nettleton mrthod
7. Calculation of Gravity and Magnetic effects due to simple shapes bodies.
8. Reduction of magnetic data
9. Interpretation of magnetic data using various techniques

OE-306: Earthquake Hazard and Mitigation

Max. Marks: 35
Credits : 2 Time: 2 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO306.1: Acquiring knowledge about the earthquakes and related geophysical phenomenon to understand the earth.

CO306.2: Communicate effectively, demonstrate and understanding of geophysical knowledge.

Special Notes:

Five questions will be set and students will attempt three questions. Question No. I will be compulsory of 20 marks and based on the conceptual aspects of the whole syllabus. The answers should not be in yes/no. In addition to question no. 1, there will be two units in the question paper each containing two questions of 15 marks each belonging to two units in the syllabus. Students will select one question from each unit.

UNIT-I:

Earthquakes, Cause of Earthquakes: Volcanic and Tectonic Causes, Seismic waves: Body and Surface waves, Plate Tectonics and Seismicity, Elastic rebound theory, Measurement of earthquakes, seismometer and seismograph, Intensity and magnitude scales,

UNIT-II:

Seismic Hazard: Probabilistic and Deterministic approaches, Seismic Risk, Seismic Gaps, Seismic Zones of India, Strong ground motions and its parameters, Factors affecting strong ground motions, Simulation of strong ground motions

RECOMMENDED BOOKS

(1) Introduction to seismology: Peter M. shearer
(2) Modern Global Seismology: Lay & Wallace
(3) Earthquake Hazard Analysis: L. Reiter
(4) An introduction to seismology, earthquakes and Earth structure: Stein & Wysession

GP-401: Petrophysics And Well Logging

Max. Marks: 60

Credits: 4 Time: 3 hours

Course Outcomes:

After completion of this course, the students will be able to:

CO401.1: Develop knowledge about the well logging technique and petrophysical properties of reservoirs

CO401.2: Learn lithological logs (spontaneous and Gamma-Gamma ray logging)

CO401.3: Understand the porosity logs for the determination of different types of porosities of rocks.

CO401.4: Learn different kinds of electrical and resistivity logging techniques for the determination of saturation of hydrocarbon

Special Notes:

Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Basics of Petrophysics and Formation Evaluation

Well logging - objectives and its place in geoexploration Formation evaluation: Hydrocarbon volume calculation; Porosity: controls on porosity, porosity determination from core; Permeability: controls on permeability and ranges, determination of permeability, permeability porosity relationship; Coring: Preservation and Handling; Electrical properties of rocks: Formation resistivity factor (FR); correlations of FR with porosity, cementation, water saturation and permeability. Wire-line logging: representation of log, tools characteristics; borehole environment, invasion and drilling mud

Unit-II: Spontaneous Potential (SP) and Natural Gamma Ray Logs

Introduction about SP logging, Principle, measurement tool, log presentation, factors affecting amplitude of SP, calculation of shale volume and other uses Fundamentals of radioactivity, scattering and attenuation, Gamma ray logging: principle, tool calibration, log representation, depth of investigation, bed resolution, calculation of shale volume, lithology identification and other uses

Unit-III: Porosity Logs

Acoustic Log: Principles; acoustic logging tools; log representation, depth of investigation and vertical resolution, logging problems, uses of acoustic logging, Formation Density Log: principle; measurement tools and operation; calibration of tool, log characteristics- depth of investigation and bed resolution; uses of formation density logging;

Neutron Log: Theory: neutron emission, scattering and absorption, Hydrogen Index, neutron logging tools, Log representation, Calibration, depth of investigation and vertical resolution; Uses of Neutron logging

Unit-IV: Electrical Resistivity Logs and other logs

Concept of resistivity, resistivity of rocks, variation of formation fluid resistivity with temperature, Archie's first and second law, Hingle and Pickett plots, Saturation of Moveable Hydrocarbons. Resistivity logging: response of tool, resistivity tools: old and modern, spherically focused log, micro-resistivity logs, proximity log, induction log, depth of investigation and bed resolution, log representation, uses of resistivity log Nuclear Magnetic Resonance (NMR) Logging: background, need of NMR logging, log representation and interpretation; Caliper logging, temperature logging, dipmeter logging, LWD

Recommended Books:

1. Standard Methods of Geophysical Formation Evaluation: James K. Hallenburg
2. Practical Formation Evaluation: Robert C. Ransom
3. The geological Interpretation of Well Logs : Malcolm Rider

4. Well Logging for Earth Scientists: Darwin V. Ellis
5. Petrophysics- Theory and Practice of Measuring Reservoir Rock and fluid Transport Properties: Djebbar Tiab and Erle C. Donaldson

GP-402 Physical Oceanography and Marine Geophysics

Max. Marks: 60
Credits: 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO402.1: Understand the physical properties, movement, and pollution in ocean waters.
CO402.2: Derive equation of motion for ocean waters and understand all the component forces.
CO402.3: Know the resource potential of land below ocean waters and the geophysical signatures in areas of continental margins.
CO402.4: Know the geophysical studies for volcanism, seismicity, crustal deformation and learn about the resource potential in Indian continental margins.

Special Notes:
Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit

Unit-I: Physical Oceanography
Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

Unit-II: Dynamical Oceanography
Equation of motion in a rotating and translating coordinate system, Coriollis force term and other terms, Nonlinear term in equation of motion, Brunt Viasala frequency, Geopotential surface and isobaric surface, wind driven ocean circulation, Ekman Solution, Sverdrup's Solution, Vorticity.

Unit-III: Marine exploration
Resource potential for offshore areas, Geophysical continental margins, type of continental margins, geophysical evidences for evolution of Atlantic type continental margins, Characteristic geophysical signatures for transitional crust, isostatic 2D gravity anomalies, sea floor magnetic anomalies and their interpretation.

Unit-IV:
Geophysical studies for active continental margins, Seismicity, volcanism, heat flow studies, seismic surveys along island arc-trench areas, seismic expression for subduction and crustal deformation, paired gravity anomalies over island arc trench areas and their interpretation. Geophysical exploration for continental Margins of India and Andman shelves, brief review on the hydrocarbon exploration for the Indian continental margin. . Review of basins in India: Assam, Krishna-Godavari, Cambay and Bombay offshore basins.

Recommended Books:

1. The Earth, Tarbuck and Lutgens
2. Descriptive Physical oceanography, Pickard Lmerv
3. Estuaries- Introduction, Dyer
4. Oceanography, Ross
5. Dynamical Ocenography, Pond and Pickard
6. The Sea, Hill
7. Nettleton, Gravity and Magnetics in Oil prospecting
8. McQuillin and Ardus, Exploring the geology of shelf area

GP-403: Seismic Prospecting

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO403.1: Understand the fundamentals of seismic methods in oil and gas exploration.
CO403.2: Design seismic acquisition survey and understand various types of seismic sources.
CO403.3: Design a sequence for processing the seismic data at hand and understand the theory of each processing step.
CO403.4: Gain knowledge of seismic interpretation using concept of amplitude variation with offset (A.V.O.) and pattern recognition.

Special Notes:
Nine questions will be set and students will attempt five questions. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit

Unit-I: Fundamental Of Prospecting
Motivation for Seismic Prospecting, Oil Exploration, Mining and Engineering Application, Principles and Physical Basis of Seismic prospecting: Types of Elastic Waves, Reflection, Refraction and Transmission Coefficients, Expression for wave velocities, Factors affecting wave velocities in Rocks.

Unit-II: Data Acquisition
Seismic Sources: Explosive and Non-Explosive Sources, Seismic Refraction Method: Travel Time Equation for Simple one layer case and for variable velocity case. Expressions for dipping layer and faulted bed cases. Gardener delay time method. Hidden layer problems. Field techniques for refraction survey, fan shooting. Seismic Reflection Method: The travel time equations for horizontally layered medium, Expression for dipping interfaces, Field techniques for reflection survey: Split Spread, End on Spread, Broad side configurations. 2D/3D configurations, Common depth point technique, Presentation formats for Seismograms, Selection of field survey parameters.

Unit-III: Seismic Data Processing
Data processing sequence, Static and Dynamic Correction, weathering and datum corrections, CDP stacking, Migration and depth section preparation.
Velocity depth determination: Velocity-depth relation for measurements in boreholes, velocity depth relation from surface observations, the T^2-X^2 method, the T-ΔT method, the hyperbola method.
Noise Elimination method: The structure of noise and its classification using frequency and spatial filters(arrays), Multiples identification, Suppression of multiples, VSP.

Unit-IV: Seismic Data Interpretation
Mapping of Hydrocarbon bearing and water bearing structures, geological interpretation, Structural and Stratigraphic traps, direct detection of hydrocarbons, pattern recognition, Seismic attribute analysis.

Recommended Books:
1. Dobrin, M.B Introduction to Geophysical Prospecting
2. W.M.Telford et al Applied eophysics
3. Keary and Brooks Introduction to Geophysical Exploration
4. Waters, R.H.. Reflection Seismology
5. Robinson Basic Exploration Geophysics

6. Sheriff, R.E Seismic Stratigraphy
7. Nelson, H.R New technologies in Exploration Geophysics
8. Lavergne, M. Seismic Methods

GP-404: Geophysical Inversion

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:
On completion of this course, the students will be able to:
CO404.1: Differentiate between forward and inverse problems. Ability to formulate inverse problems and solution of linear inverse problems.
CO404.2: Get acquainted with the techniques of Finite difference method and Finite element method.
CO404.3: Acquire the knowledge about the techniques for checking the quality of solution of inverse problems, the Singular Value Decomposition and techniques to solve non-linear inverse problems.
CO404.4: Learn about global optimization techniques and statistical approach of inverse problems.

Special Notes:
(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction
Forward problems versus Inverse problems, continuous inverse problem, discrete inverse problem, formulation of inverse problems and their reduction to a matrix problem, linear inverse problems, classification of inverse problems, L1 norm inversion, least squares solution and minimum norm solution, concept of norms, concept of 'a priori' information, constrained linear least squares inversion, review of matrix theory, Geophysical inverse problems.

Unit-II: Finite difference and Finite Element Method
Introduction to finite difference method, forward, backward and central difference method, Application of finite difference method for solving Helmholtz equation.
Introduction to finite element method, various steps, simple examples showing application of finite element method.

Unit-III: Non-Linear Inversion
Model and Data spaces, householder transformation, data resolution matrix, model resolution matrix, checkerboard resolution test, eigen values and eigen vectors, singular value decomposition (SVD), generalised inverses, Non-linear inverse problems, Gauss Newton method,, steepest descent (gradient) method, Marquardt-Levenberg method, Earthquake location problem, tomography problem, Inversion of gravity profiles due to simple geometrical shape, Applications of non-linear inversion techniques in seismology.

Unit-IV: Global Optimization Techniques:
Probabilistic approach of inverse problems, maximum likelihood and stochastic inverse methods, Backus-Gilbert method, Global optimization techniques: genetic algorithm:Heat Bath algorithm, Metropolis algorithm, simulated annealing methods, neighbourhood algorithm, examples of applying global optimization techniques.

Recommended Books:

(1) Geophysical data analysis: Discrete inverse theory: William Menke
(2) Deconvolution & Inversion: V.P. Dimri
(3) Geophysical Data analysis: Understanding Inverse problem theory & Practice: Max A. Meju
(4) Time series analysis and inverse theory for Geophysicists: David Gubbins
(5) Inverse problem theory methods for data fitting and model parameter estimation : I. Tarantola

GP-405: Geophysical Lab-V

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO405.1: Solve geophysical problems using Seismic principles and its techniques/tools to explore interior of earth.

CO405.2: Inculcate research aptitude to enhance the understanding of geophysical knowledge.

CO405.3: Analyse and interpret the geophysical data to communicate effectively and demonstrate for understanding of geophysical knowledge.

CO405.4: Tackle the issues of professional geophysical practices to be used in Industry.

1. Seismic Survey using engineering seismograph
2. Two layer and three layer problems of seismic refraction method for horizontal and dipping interface
3. Identification of faults on seismic refraction data
4. Static and Dynamic corrections to seismic data
5. NMO stretching effect
6. Interpretation of reflection data using $T^2 - X^2$ method, T-ΔT method etc.
7. Estimation of different types of velocities in Seismic method
8. Exposure to seismic data processing

GP-406: Geophysical Lab-VI

Max. Marks: 90
Credits : 6 Time: 4 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO406.1: Solve geophysical problems using inversion techniques/tools.

CO406.2: Communicate effectively, demonstrate and understanding of geophysical knowledge.

CO406.3: Analyse and interpret the geophysical data.

CO406.4: Tackle the issues of professional geophysical practices.

Exercises based on:

(1) Eigen values and Eigen vectors

(2) Formulation & Solution of inverse problems

(3) Linear estimation of parameters

(4) Constrained and Unconstrained least square inversion

(5) SVD analysis

(6) Different techniques of Geophysical Inversion

GP-407: Geophysical Field Training-I

Credits: 4 **Max Marks: 100**

Time : 30 Minutes per student

Course Outcomes:

After completion of this course, the students will be able to

CO407.1: Inculcate the sense of scientific discussion and research aptitude.

CO407.2: Develop practical knowledge about different geophysical methods with perspective to future research.

CO407.3: Hands-on practice to different geophysical instruments and learning their operations in the field.

CO407.4: Exposure of latest geophysical techniques and software as well as developing concepts of data acquisition, processing and interpretation.

GP-501: Near. Surface Geophysics

Max. Marks: 60

Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO501.1: Learn about the concept and fundamentals of near surface geophysics.

CO501.2: Understand the different applications of geophysical methods to Environmental and Engineering studies.

CO501.3: Learn about the basic of GPR data acquisition, processing and interpretation.

CO501.4: Understand the GIS Applications in Near surface Geophysics.

Special Notes:

Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction

Man and Environment, Near Surface Geophysics: Introduction, Practitioners and Users, Traditional and Emerging views of Near Surface- Geophysics, Concepts and Fundamentals, Special Challenges associated with near Surface Geophysics. Rock Physics Principles for Near-Surface Geophysics: Description of the Geological Material, Conditions in the Near Surface of the Earth, Density, Electrical Properties, Elastic Wave Velocities.

Unit-II: Geophysical Techniques in Near Surface studies

Review of Seismic, Gravity, Magnetic and Electrical methods, Applications of these methods to Environmental and Engineering studies: Delineation of structural trends, contacts and faults, microgravity detection of subsurface voids and cavities, detection of Archaeological objects, Mapping of fracture zones, reflection profiling in ground water studies, dam site investigations, evaluation of aquifer potential, Investigation of waste dump sites.

Unit-III: Ground-Penetrating Radar

Introduction, Electromagnetic Theory, Physical properties, EM wave properties, GPR Instrumentation, Survey Design, Data processing, Interpretation, Case Studies and Pit falls.

Unit-IV: GIS Applications in Near Surface Geophysics

Concept of Digital Image in Remote Sensing, Image preprocessing, rectification, enhancements and analysis, Digital Image processing procedures, Band ratioing and NDVI, GIS applications in integrated ground water resources mapping, site suitability studies and utilities management, GIS applications for engineering, environmental problems, landfill sites and solid waste management,

Recommended Books:

1. Near-Surface Geophysics Edited by Dwain K. Butler
2. Applied Geophysics by W. M. Telford et al.
3. Experiments in Engineering Geology by KVGK Gokhale and D M Rao
4. Geotechnical and Environmental Geophysics Edited by Stanley H.Ward
5. Environmental and Engineering Geophysics, P.V.Sharma

GP-502: Electromagnetic and Magnetotelluric Methods

Max. Marks: 60
Credits: 4 Time: 3 hours

Course Outcomes:
On completion of this course, the students will be able to:
CO502.1: Learn about the basic of Electromagnetic method.
CO502.2: Understand the data acquisition, processing and interpretation of various electromagnetic methods.
CO502.3: Learn about the basic of Magnetotelluric method, data acquisition and processing.
CO502.4: Capable of Interpretation of Magnetotelluric Data and its applications.

Special Notes:
Nine questions will be set and students will attempt five questions in all. Question No.1 is compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answer should not be in yes and no. In addition to Question 1, there will be four-unit question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I

EM Principle: Maxwell's equations, electromagnetic potential and wave equations, attenuation of EM field, depth of penetration, dip and tilt angles, electromagnetic field due to straight wire, rectangular and circular loops, elliptical polarizations, amplitude and phase relations, real and imaginary (quadrature) components. Transient electromagnetic methods (TEM), transient emf and magnetic field behaviour due to various conductors; current density in half space by rectangular loop with time, toroidal and poloidal induction in a conductive zone, various time domain systems frequency sounding and geometric sounding, advantage of time domain methods over frequency domain methods.
Electromagnetic properties of rocks and minerals

Unit-II

EM Prospecting and Interpretation: various EM methods: Dip angle methods-fixed vertical loop transmitter, two frame method, Turam method, Moving source-receiver methods- horizontal loop (Slingram) method, AFMAG and VLF methods, Airborne EM systems- rotary field method, EM profiling and sounding. Marine Electromagnetic Methods, EM modelling.

Unit-III

MT Principle: Origin and sources of MT signal, interaction with the earth-uniform earth, horizontal layers, anisotropy, inhomogeneity, impedance tensor and tipper, topographic and regional effects, static shift. Data processing and analysis: auto and cross spectra, solution to the impedance and tipper equations, local and remote references, errors and noise. Robust and hybrid processing.

Unit-IV

MT Interpretation and uses: interpretation of MT data over a two layered earth, strike, rotation swift strike, polar diagram, tipper, skew, ellipticity, TE and TM modes, 1D and 2D interpretation, imaging continental lower crust, MT study over cratons. Mapping structures for petroleum exploration, geothermal mapping, exploration for sulphides, gold, uranium. Detecting water and subsurface structures.

Recommended Books:

1. Nabighian, M. N., 1988, Electromagnetic Methods in Geophysics, Volume 1, SEG Publication.
2. Nabighian, M. N., 1991, Electromagnetic Methods in Geophysics, Volume 2, Parts A and B, SEG Publication.
3. MICHAEL S. ZHDANOV, Geophysical Electromagnetic Theory and Methods
4. Grant, F. S., and West, G. F., Interpretation Theory in Applied Geophysics
5. Telford et. al: Applied Geophysics
6. Patra & Mallick: Geosounding Principles Vol.II
7. Geoelectromagnetism: Wait, J.R.,

GP-503: Geophysical Lab-VII

Max. Marks: 90
Credits: 6 Time: 4 hours

Course Outcomes:

After completion of this course, the students will be able to

CO503.1: Get practical exposure to the processing and interpretation of different types of logs and designing of filters.

CO503.2: Hands-on exercise to interpret lithological logs to delineate permeable and impermeable zones.

CO503.3: Interpret resistivity and porosity logs to delineate water bearing and oil/gas bearing zones.

CO503.4: Get exposure of latest geophysical softwares for signal processing and imaging the seismic sections.

(A) Exercises based upon:

(i) SP log

(ii) Natural Gamma Log

(iii) Caliper and Temperature Log

(iv) Resistivity Log

(a) Micro log

(b) latero log

(c) induction log

(v) Porosity Logs:

(a) Neutron log

(b) Acoustic log

(c) Density log

(vi) Computation of formation factor and water saturation.

(B) Exercises based on

(i) Design of optimum wiener filter

(ii) Exercises on Seismic Signal Processing softwares like PITSA, GEODEPTH, FOCUS etc

GP-504: Geophysical Lab-VIII

Max. Marks: 90

Credits : 6 Time: 4 hours

Course Outcomes:

On completion of this course, the students will be able to

CO504.1: Demonstrate and apply geophysical knowledge as a member/leader of the team.
CO504.2: Capable of identifying, formulating and analysing the given geophysical problem.
CO504.3: Develop critical thinking and develop skills to write a project report.
CO504.4: Communicate effectively, demonstrate and understanding of geophysical knowledge.

Problems/Case studies based on Geophysical Methods including:

(i) Seismology

(ii) Exploration Seismology

(iii) Seismic Signal Processing

(iv) Gravity & Magnetic Methods

(v) Electrical Methods

(vi) Geophysical Well logging

(vii) Remote Sensing & GIS

GP-506: Computational Seismology

Max. Marks: 60
Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to:

CO506.1: Understand the concepts and simulating techniques of earthquake strong ground motions.
CO506.2: Understand the wave attenuation, Quality factor (Q) and techniques of determining Q and earthquake source parameters.
CO506.3: Understand the concepts of earthquake hazard, probabilistic and deterministic approach, microzonation and site amplification functions.
CO506.4: Understand the seismic tomography, velocity analysis, seismicity parameters, fractals, ray tracing, GPS, anisotropy and time predictable model.

Special Notes:
(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit I Strong motion seismology
Concept of strong motion: Characteristics of earthquake strong ground motion, time domain and frequency domain parameters of strong ground motion, strong motion array and recorder, dynamics of vibration, vibration of a single degree of freedom system, earthquake response spectra, Strong motion networks in India
Modelling of strong ground motion: Stochastic modelling technique, concept of dynamic corner frequency, Empirical Greens function technique, Semi empirical technique and Composite source modelling technique, hybrid technique, point and finite fault sources, Simulation of earthquake strong ground motions at bedrock and at surface level.

Unit II Attenuation Studies
Wave attenuation: geometrical spreading, scattering and intrinsic attenuation, Quality factor Q and its estimation using frequency domain methods, origin of coda waves, coda-Q and its estimation, Q estimation from different parts of seismograms, estimation of frequency independent and frequency dependent Q using strong ground motion, simultaneous estimation of source parameters and Q, concept of 3-D Q and its estimation.

Unit III Engineering seismology
Concept of earthquake hazard, vulnerability and risk, probabilistic versus deterministic approach of estimating earthquake hazard, seismic quiescence/gaps, Regression analysis for estimating peak ground motion, microzonation, Different techniques of estimating site amplification functions using microtremors and earthquake waveforms, Applications in hydrocarbon detection, concept of earthquake resistant design, Indian earthquake hazard scenario.

Unit IV: Selected Topics
Seismic tomography – Methods, regional and local tomography, 3-D velocity analysis, Receiver functions, Seismicity based studies- b-value, fractal and multifractal analysis, Dq-q analysis, self similarity, Ray tracing, Anisotropy, Time predictable model, GPS based studies in seismology.

RECOMMENDED BOOKS

(1) Quantity Seismology: Aki and Richards

(2) Introduction to seismology: Peter M. shearer
(3) Modern Global Seismology: Lay & Wallace
(4) Earthquake Hazard Analysis: L. Reiter
(5) An introduction to seismology, earthquakes and Earth structure: Stein & Wysession

GP-513: Seismic Data Analysis and Reservoir Geophysics

Max. Marks: 60

Credits : 4 Time: 3 hours

Course Outcomes:

On completion of this course, the students will be able to

CO513.1: Understand the sequence of seismic data processing.

CO513.2: Understand the technique of seismic deconvolution and seismic migration in data processing.

CO513.3: Understand the concepts of seismic modeling in application to the seismic reservoir.

CO513.4: Understand the various seismic reservoir exploration and surveillance techniques: A.V.O. analysis, 4D monitoring, and 4C analysis.

Special Notes:

(i) Nine questions will be set and students will attempt five questions. Question no. I will be compulsory and based on the conceptual aspects of the whole syllabus. It can have 5 to 10 parts. The answers should not be in yes/no. In addition to question no. I, there will be four units in the question paper each containing two questions belonging to four units in the syllabus. Students will select one question from each unit.

Unit-I: Introduction

Objectives of Seismic Signal Processing, Seismic Resolution, Basic data processing sequence: CMP sorting, Velocity analysis, residual statics corrections, Normal-Moveout Correction, Moveout stretch, Noise and Multiple Attenuation, f-k filtering, τ-p filtering, Dip-Moveout correction, CMP stacking, post stack processing.

Unit-II: Seismic Deconvolution and Seismic Migration

The convolutional Model, Inverse Filtering, Optimum Wiener filters, Predictive deconvolution in practice, The problem of nonstationarity: Time-Variant deconvolution, gated Wiener deconvolution, Homomorphic deconvolution, Minimum and Maximum Entropy Deconvolution, Inverse Q Filtering, Fresnel Zone, Seismic Migration: Mathematical foundation of migration, Migration using wave equation, Kirchhoff's theory , Pre and Post stack time and depth migration

Unit-III: Seismic Modeling

The role of Seismic Modeling, Concept and example of Physical Models, Seismic Modeling Approaches, Forward Seismic Modeling, Inverse Seismic Modeling, Application of GLI technique, Modeling pitfalls, Ray Tracing using Snell's Law, and Ray-bending.

Unit-IV: Reservoir Geophysics

Reservoir Management, Geophysical Method for Reservoir Surveillance, Analysis of AVO, Acoustic Impedance Estimation, 4-D Seismic Method, Interpretation with SH-wave, 4-C Seismic Method. Unconventional energy sources: Shale gas; Coal Bed Methane; Gas Hydrates.

Recommended Books:

1. Seismic Data Analysis, Vol. I&II, ÖZYILMAZ.
2. Reservoir Geophysics, Robert E.Sheriff.
3. Seismic Modeling of Geologic Structures, Stuart W.Fagin.
4. Introduction to Seismic Inversion Method, Brian H.Russell