

**INSTITUTE OF PHARMACEUTICAL SCIENCES,  
KURUKSHETRA UNIVERSITY KURUKSHETRA**

**SCHEME OF EXAMINATION FOR B. PHARM. COURSE (B. PHARM. I  
and II SEMESTER ONLY) UNDER CHOICE BASED CREDIT SYSTEM  
(CBCS)**

w.e.f. the academic session 2017-18

1. These regulations shall be called as “The Revised Regulations for the B. Pharm. Degree Program (CBCS) of the Pharmacy Council of India, New Delhi”. They shall come into effect from the Academic Year 2017-18. The regulations framed are subject to modifications from time to time by Pharmacy Council of India, New Delhi.
2. **Program/Course credit structure**  
As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.
3. **Minimum credit requirements**  
The minimum credit points required for award of a B. Pharm. degree is 210. These credits are divided into Theory courses, Tutorials, Practical, Practice School and Project over the duration of eight semesters. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus. The lateral entry students shall get 52 credit points transferred from their D.Pharm program. Such students shall take up additional remedial courses of ‘Communication Skills’ (Theory and Practical) and ‘Computer Applications in Pharmacy’ (Theory and Practical) equivalent to 3 and 4 credit points respectively, a total of 7 credit points to attain 59 credit points, the maximum of I and II semesters.
4. **Course of study**  
The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to II. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to II.

**Table-I: Course of study for semester I**

Course code	Name of the course	No. of hours	Tutorial	Credits
BP101T	Human Anatomy and Physiology I– Theory	3	1	4
BP102T	Pharmaceutical Analysis I– Theory	3	1	4
BP103T	Pharmaceutics I – Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry –Theory	3	1	4
BP105T	Communication skills – Theory *	2	--	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2	--	2
BP107P	Human Anatomy and Physiology –Practical	4	--	2
BP108P	Pharmaceutical Analysis I – Practical	4	--	2
BP109P	Pharmaceutics I – Practical	4	--	2
BP110P	Pharmaceutical Inorganic Chemistry- Practical	4	--	2
BP111P	Communication skills – Practical*	2	--	1
BP112RBP	Remedial Biology – Practical*	2	--	1
	<b>Total</b>	<b>32/34<sup>§</sup>/36<sup>#</sup></b>	<b>4</b>	<b>27/29<sup>§</sup>/30<sup>#</sup></b>

<sup>#</sup>Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB) course.

<sup>§</sup>Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.

\* Non University Examination (NUE)

**Table-II: Course of study for semester II**

Course code	Name of the course	No. of hours	Tutorial	Credits
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory*	3	--	3
BP206T	Environmental sciences – Theory *	3	--	3
BP207P	Human Anatomy and Physiology II –Practical	4	--	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	--	2
BP209P	Biochemistry – Practical	4	--	2
BP210P	Computer Applications in Pharmacy – Practical*	2	--	1
	<b>Total</b>	<b>32</b>	<b>4</b>	<b>29</b>

\*Non University Examination (NUE)

**Table-III: Semester wise credits distribution**

Semester	Credit Points
I	27/29 <sup>§</sup> /30 <sup>#</sup>
II	29
<b>Total credit points for the program</b>	<b>56/58<sup>§</sup>/59<sup>#</sup></b>

<sup>§</sup>Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

<sup>#</sup>Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

## 5. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given below:

### 5.1 Internal assessment (25 Marks): Continuous mode (10 Marks) + Sessional Tests (15 Marks)

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

**Table-IV: Scheme for awarding internal assessment: Continuous mode**

THEORY		
Criteria	Maximum Marks	
Attendance (Refer Table – V)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assignment, open book test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
<b>Total</b>	<b>10</b>	<b>05</b>
PRACTICALS		
Attendance (Refer Table – V)	2	
Based on Practical Records, Regular viva voce, etc.	3	
<b>Total</b>	<b>5</b>	

**Table- V: Guidelines for the allotment of marks for attendance**

Percentage of Attendance	Theory	Practical
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

**Tables-VI: Schemes for internal assessments and end semester examinations semester wise**

**SEMESTER I**

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks		Total	Marks	Duration	
			Exams	Duration				
BP101T	Human Anatomy and Physiology I– Theory	10	15	1 Hr	25	75	3 Hr	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hr	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hr	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hr	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hr	50
BP106RBT	Remedial Biology/	5	10	1 Hr	15	35	1.5 Hr	50
BP106RMT	Mathematics – Theory*							
BP107P	Human Anatomy and Physiology – Practical	5	10	4 Hr	15	35	4 Hr	50
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hr	15	35	4 Hr	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hr	15	35	4 Hr	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hr	15	35	4 Hr	50
BP111P	Communication skills – Practical*	5	5	2 Hr	10	15	2 Hr	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hr	10	15	2 Hr	25
	<b>TOTAL</b>	<b>70/75<sup>§</sup>/80<sup>#</sup></b>	<b>115/125<sup>§</sup>/ 130<sup>#</sup></b>	<b>23/24<sup>§</sup>/26<sup>#</sup> Hrs</b>	<b>185/200<sup>§</sup>/ 210<sup>#</sup></b>	<b>490/525<sup>§</sup>/ 540<sup>#</sup></b>	<b>31.5/33<sup>§</sup>/ 35<sup>#</sup> Hrs</b>	<b>675/725<sup>§</sup>/ 750<sup>#</sup></b>

<sup>#</sup>Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB) course.

<sup>§</sup>Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.

\* Non University Examination (NUE)

**Tables-VI: Schemes for internal assessments and end semester examinations semester wise**

**SEMESTER II**

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Marks		Total	Marks	Duration	
			Exams	Duration				
BP201T	Human Anatomy and Physiology II – Theory	10	15	1 Hr	25	75	3 Hr	100
BP202T	Pharmaceutical Organic Chemistry I – Theory	10	15	1 Hr	25	75	3 Hr	100
BP203T	Biochemistry – Theory	10	15	1 Hr	25	75	3 Hr	100
BP204T	Pathophysiology – Theory	10	15	1 Hr	25	75	3 Hr	100
BP205T	Computer Applications in Pharmacy – Theory*	10	15	1 Hr	25	50	2 Hr	75
BP206T	Environmental sciences – Theory *	10	15	1 Hr	25	50	2 Hr	75
BP207P	Human Anatomy and Physiology II – Practical	5	10	4 Hr	15	35	4 Hr	50
BP208P	Pharmaceutical Organic Chemistry I– Practical	5	10	4 Hr	15	35	4 Hr	50
BP209P	Biochemistry – Practical	5	10	4 Hr	15	35	4 Hr	50
BP210P	Computer Applications in Pharmacy – Practical*	5	5	2 Hr	10	15	2 Hr	25
	<b>Total</b>	<b>80</b>	<b>125</b>	<b>20 Hrs</b>	<b>205</b>	<b>520</b>	<b>30 Hrs</b>	<b>725</b>

\*Non University Examination (NUE)

## 5.2 Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical Sessional examinations is given in table – IV. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in table – VI. Sessional exam shall be conducted for 30 marks for theory and shall be computed for 15 marks. Similarly Sessional exam for practical shall be conducted for 40 marks and shall be computed for 10 marks.

## 5.3 Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

## 6. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course including internal assessment as specified above, then he/she shall reappear for the end semester examination of that course only. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

## 7. End Semester Examinations

The End Semester Examinations for each theory and practical course through semesters I to II shall be conducted by the university as shown in Table VII. For the subjects with asterix symbol (\*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university as given in table–VIII.

## 8. Question paper pattern for end semester theory examinations For 75 marks paper

I. Multiple Choice Questions (MCQs) = 20 x 1 = 20

OR

OR

Objective Type Questions (10 x 2) = 10 x 2 = 20

(Answer all the questions)

II. Long Answers (Answer 2 out of 3) = 2 x 10 = 20

III. Short Answers (Answer 7 out of 9) = 7 x 5 = 35

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Total = 75 marks

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**For 50 marks paper**

I. Long Answers (Answer 2 out of 3) = 2 x 10 = 20

II. Short Answers (Answer 6 out of 8) = 6 x 5 = 30

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Total = 50 marks  
-----**For 35 marks paper**

I. Long Answers (Answer 1 out of 2) = 1 x 10 = 10

II. Short Answers (Answer 5 out of 7) = 5 x 5 = 25

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Total = 35 marks  
-----**Question paper pattern for end semester practical examinations**

I. Synopsis = 5

II. Experiments = 25

III. Viva voce = 5

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Total = 35 marks  
-----**9. End semester and Reappear examinations**

End semester examination shall be conducted as per the schedule given in table VII. The exact dates of examinations shall be notified by the University.

**Table-VII: Tentative schedule of end semester examinations**

Semester	For Regular Candidates	For Failed Candidates
I, III, V and VII	November / December	May / June
II, IV, VI and VIII	May / June	November / December

**10. Promotion and award of grades**

A student shall be declared PASS and eligible for getting grade in a course of B.Pharm. program if he/she secures at least 50% marks in that particular course including internal assessment. For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

**11. Grading of performances (Letter grades and grade points allocations)**

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table – VIII.

**Table-VIII**

<b>Percentage of Marks Obtained</b>	<b>Letter grade</b>	<b>Grade Point</b>	<b>Marks</b>
90.00-100	O	10	Outstanding
80.00-89.99	A	9	Excellent
70.00-79.99	B	8	Good
60.00-69.99	C	7	Fair
50.00-59.99	D	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

A student who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

**12. The Semester grade point average (SGPA)**

The performance of a student in a semester is indicated by a number called ‘Semester Grade Point Average’ (SGPA). The SGPA is the weighted average of the grade points Obtained in all the courses by the student during the semester. For example, if a student takes five courses(Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student’s grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students’ SGPA is equal to:

$$\text{SGPA} = \frac{\mathbf{C1G1 + C2G2 + C3G3 + C4G4+ C5G5}}{\mathbf{C1 + C2 + C3 + C4+ C5}}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{\mathbf{C1G1 + C2G2 + C3G3 + C4* ZERO + C5G5}}{\mathbf{C1 + C2 + C3 + C4+ C5}}$$

**13. Cumulative Grade Point Average (CGPA)**

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{\mathbf{C1S1 + C2S2 + C3S3 + C4S4+ C5S5+ C6S6+ C7S7+ C8S8}}{\mathbf{C1 + C2 + C3 + C4+ C5+ C6+ C7+ C8}}$$



where  $C_1, C_2, C_3, \dots$  is the total number of credits for semester I, II, III,  $\dots$  and  $S_1, S_2, S_3, \dots$  is the SGPA of semester I, II, III,  $\dots$ .

**14. Declaration of class**

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction = CGPA of 7.50 and above

First Class = CGPA of 6.00 to 7.49

Second Class = CGPA of 5.00 to 5.99

**15. Award of Ranks**

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the B.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the B. Pharm program in minimum prescribed number of years, (four years) for the award of Ranks.

**16. Award of degree**

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

# INSTITUTE OF PHARMACEUTICAL SCIENCES, KURUKSHETRA UNIVERSITY KURUKSHETRA

## B.PHARMACY-I SEMESTER (2017-2018)

### BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I

**Scope :** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

**Objectives:** Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

1.      **Introduction to human body:** Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.      10 hours  
         **Cellular level of organization:** Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine  
         **Tissue level of organization:** Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.
2.      **Integumentary system:** Structure and functions of skin      10 hours  
         **Skeletal system:** Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal

system Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

**Joints:** Structural and functional classification, types of joints movements and its articulation

3. **Body fluids and blood:** Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.  
**Lymphatic system:** Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system 10 hours
4. **Peripheral nervous system:** Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.  
**Special senses:** Structure and functions of eye, ear, nose and tongue and their disorders. 8 hours
5. **Cardiovascular system:** Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart. 7 hours

## **BP107P. HUMAN ANATOMY AND PHYSIOLOGY PRACTICAL**

**Max. Marks: 35**

**4 Hours/week**

**Exam. hours: 04**

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

### Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
4. Text book of Medical Physiology- Arthur C, Guyton and John .E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

### Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

### BP102T. PHARMACEUTICAL ANALYSIS-I

**Scope :** This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

**Objectives:** Upon completion of the course student shall be able to

1. understand the principles of volumetric and electro chemical analysis
2. carryout various volumetric and electrochemical titrations
3. develop analytical skills
- 4.

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each

**Candidates** Question carry 5 Marks.

1. **(a) Pharmaceutical analysis-** Definition and scope i) Different techniques of analysis ii) Methods of expressing concentration iii) Primary and secondary standards. iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate  
**(b)Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures (c)Pharmacopoeia, Sources of impurities in medicinal agents,limit tests. 10 hours
2. **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves  
**Non aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl 10 hours
3. **Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.  
**Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.  
**Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate. Basic Principles,methods and application of diazotisation titration. 10 hours
4. **Redox titrations:** (a) Concepts of oxidation and reduction, (b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate 8 hours
5. **Electrochemical methods of analysis** 7 hours  
**Conductometry-** Introduction, Conductivity cell, Conductometric titrations, applications.  
**Potentiometry -** Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.  
**Polarography -** Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

## BP108P. PHARMACEUTICAL ANALYSIS-I PRACTICAL

Max. Marks: 35

4 Hours/week

Exam. hours: 04

### I Limit Test of the following

- (1) Chloride                      (2) Sulphate                      (3) Iron                      (4) Arsenic

### II Preparation and standardization of

- (1) Sodium hydroxide                      (2) Sulphuric acid                      (3) Sodium thiosulfate                      (4) Potassium permanganate  
(5) Ceric ammonium sulphate

### III Assay of the following compounds along with Standardization of Titrant

- (1) Ammonium chloride by acid base titration                      (2) Ferrous sulphate by Cerimetry  
(3) Copper sulphate by Iodometry                      (4) Calcium gluconate by complexometry  
(5) Hydrogen peroxide by Permanganometry                      (6) Sodium benzoate by non-aqueous titration  
(7) Sodium Chloride by precipitation titration

### IV Determination of Normality by electro-analytical methods

- (1) Conductometric titration of strong acid against strong base  
(2) Conductometric titration of strong acid and weak acid against strong base  
(3) Potentiometric titration of strong acid against strong base

### Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.

## BP103T. PHARMACEUTICS- I

**Scope :** This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

**Objectives:**

Upon completion of this course the student should be able to:

1. Know the history of profession of pharmacy
2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations

3. Understand the professional way of handling the prescription
4. Preparation of various conventional dosage forms

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

1.      **Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia. 10 hours  
**Dosage forms:** Introduction to dosage forms, classification and definitions  
**Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.  
**Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.
2.      **Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight. 10 hours  
**Powders:** Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.  
**Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques.
3.      **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions. 10 hours  
**Biphasic liquids:**  
**Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.  
**Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability

problems and methods to overcome.

4. **Suppositories:** Definition, types, advantages and disadvantages, 8 hours  
types of bases, methods of preparations. Displacement value & its  
calculations, evaluation of suppositories.  
**Pharmaceutical incompatibilities:** Definition, classification,  
physical, chemical and therapeutic incompatibilities with examples.
5. **Semisolid dosage forms:** Definitions, classification, mechanisms 7 hours  
and factors influencing dermal penetration of drugs. Preparation of  
ointments, pastes, creams and gels. Excipients used in semi solid  
dosage forms. Evaluation of semi solid dosages forms.

### **BP109P. PHARMACEUTICS-I PRACTICAL**

**Max. Marks: 35**

**4 Hours/week**

**Exam. hours: 04**

1. **Syrups:** a) Syrup IP'66                      b) Compound syrup of Ferrous Phosphate BPC'68
2. **Elixirs** a) Piperazine citrate elixir                      b) Paracetamol pediatric elixir
3. **Linctus** a) Terpin Hydrate Linctus IP'66    b) Iodine Throat Paint (Mandles Paint)
4. **Solutions:** a) Strong solution of ammonium acetate    b) Cresol with soap solution    c) Lugol's solution
5. **Suspensions:** a) Calamine lotion    b) Magnesium Hydroxide mixture    c)                      Aluminium Hydroxide gel
6. **Emulsions** a) Turpentine Liniment                      b) Liquid paraffin emulsion
7. **Powders and Granules:** a) ORS powder (WHO)    b) Effervescent granules                      c) Dusting powder                      d) Divided powders
8. **Suppositories:** a) Glycero gelatin suppository    b) Cocoa butter suppository    c) Zinc Oxide suppository
9. **Semisolids:** a) Sulphur ointment    b) Non staining-iodine ointment with methyl salicylate    c) Carbopal gel
10. **Gargles and Mouthwashes:** a) Iodine gargle    b) Chlorhexidine mouthwash



### Recommended Books (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy,Lea& Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

### BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY

**Scope :** This subject deals with the monographs of inorganic drugs and pharmaceuticals.

**Objectives:** Upon completion of course student shall be able to

1. know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
2. understand the medicinal and pharmaceutical importance of inorganic compounds

**THEORY Max. Marks: 75**

**Total hours: 45**

**3 Hours/week**

**Exam. hours: 03**

**Instructions to the paper-setter** The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates** Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

1. **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate  
**General methods of preparation,** assay for the compounds superscripted with **asterisk (\*)**, properties and medicinal uses of inorganic compounds belonging to the following classes 10 hours
2. **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. 10 hours  
**Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride\*, Potassium chloride, Calcium gluconate\* and Oral Rehydration Salt (ORS), Physiological acid base balance.  
**Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.
3. **Gastrointestinal agents** 10 hours  
**Acidifiers:** Ammonium chloride\* and Dil. HCl  
**Antacid:** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate\*, Aluminum hydroxide gel, Magnesium hydroxide mixture  
**Cathartics:** Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite  
**Antimicrobials:** Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide\*, Chlorinated lime\*, Iodine and its preparations
4. **Miscellaneous compounds** 8 hours  
**Expectorants:** Potassium iodide, Ammonium chloride\*. **Emetics:** Copper sulphate\*, Sodium potassium tartarate **Haematinics:** Ferrous sulphate\*, Ferrous gluconate  
**Poison and Antidote:** Sodium thiosulphate\*, Activated charcoal, Sodium nitrite
5. **Astringents:** Zinc Sulphate, Potash Alum  
**Radiopharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances. 7 hours

## BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY PRACTICAL

Max. Marks: 35

4 Hours/week

Exam. hours: 04

**I Limit tests for following ions:** Limit test for Chlorides and Sulphates, Modified limit test for Chlorides and Sulphates, Limit test for Iron, Limit test for Heavy metals, Limit test for Lead, Limit test for Arsenic

**II Identification test:** Magnesium hydroxide Ferrous sulphate Sodium bicarbonate Calcium gluconate Copper sulphate

**III Test for purity:** Swelling power of Bentonite, Neutralizing capacity of aluminum hydroxide gel, Determination of potassium iodate and iodine in potassium Iodide

**IV Preparation of inorganic pharmaceuticals:** Boric acid Potash alum Ferrous sulphate

#### **Recommended Books (Latest Editions)**

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia

#### **BP105T.COMMUNICATION SKILLS\***

**Scope :** This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Upon completion of the course the student shall be able to

- Objectives:**
1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
  2. Communicate effectively (Verbal and Non Verbal)
  3. Effectively manage the team as a team player
  4. Develop interview skills
  5. Develop Leadership qualities and essentials

**THEORY**      **Max. Marks: 35**                      **Total hours : 30**                      **2 Hours/week**  
**Exam. hours: 1.5**

**Instructions to the paper-setter**      The question paper contains 2 Sections. **Section A** have 2 questions (any one, 10 marks each) carrying 10 marks. **Section B** have 7 questions (any five, 5 marks each) carrying 25 marks.

**Instructions**      Attempt any **ONE** questions from Section A. Each Question carry 10 Marks.

to  
Candidates Attempt any **FIVE** questions from Section B. Each Question carry 5 Marks.

1. **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context  
**Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers  
**Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment 07 hours
2. **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication  
**Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style. 07 hours
3. **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations 07 hours  
**Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication  
**Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message
4. **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview 05 hours  
**Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery
5. **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion 04 hours

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### BP111P.COMMUNICATION SKILLS PRACTICAL\*

**Max. Marks: 15**

**2 Hours/week**

**Exam. hours: 02**

The following learning modules are to be conducted using wordsworth ® English language lab software

**Basic communication covering the following topics**

Meeting People Asking Questions Making Friends What did you do? Do's and Dont's

**Pronunciations covering the following topics** Pronunciation (Consonant Sounds) Pronunciation

and Nouns

Pronunciation (Vowel Sounds)

### **Advanced Learning**

Listening Comprehension / Direct and Indirect Speech

Figures of Speech Effective Communication Writing Skills

Effective Writing Interview Handling Skills E-Mail etiquette

Presentation Skills

**\*NUE – Non-University Examination**

### **Recommended Books (Latest Editions)**

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

### **BP 106RBT.REMEDIAL BIOLOGY\***

**Scope :** To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

**Objectives:** Upon completion of the course, the student shall be able to

1. know the classification and salient features of five kingdoms of life
2. understand the basic components of anatomy & physiology of plant
3. know understand the basic components of anatomy & physiology animal with special reference to human

**THEORY**      **Max. Marks: 35**                      **Total hours : 30**                      **2 Hours/week**  
**Exam. hours: 1.5**

**Instructions to the paper-setter**      The question paper contains 2 Sections. **Section A** have 2 questions (any one, 10 marks each) carrying 10 marks. **Section B** have 7 questions (any five, 5 marks each) carrying 25 marks.

**Instructions to Candidates** Attempt any **ONE** questions from Section A. Each Question carry 10 Marks.  
Attempt any **FIVE** questions from Section B. Each Question carry 5 Marks.

- 1. Living world:** i) Definition and characters of living organisms ii) 07 hours  
Diversity in the living world  
iii) Binomial nomenclature iv) Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,  
**Morphology of Flowering plants:** Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed. General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledons.
- 2. Body fluids and circulation** i) Composition of blood, blood groups, 07 hours  
coagulation of blood  
ii) Composition and functions of lymph iii) Human circulatory system  
iv) Structure of human heart and blood vessels v) Cardiac cycle, cardiac output and ECG  
**Digestion and Absorption** i) Human alimentary canal and digestive glands  
ii) Role of digestive enzymes iii) Digestion, absorption and assimilation of digested food  
**Breathing and respiration** i) Human respiratory system ii) Mechanism of breathing and its regulation iii) Exchange of gases, transport of gases and regulation of respiration iv) Respiratory volumes
- 3. Excretory products and their elimination:** i) Modes of excretion ii) 07 hours  
Human excretory system- structure and function iii) Urine formation iv) Renin-angiotensin system  
**Neural control and coordination:** i) Definition and classification of nervous system ii) Structure of a neuron iii) Generation and conduction of nerve impulse iv) Structure of brain and spinal cord v) Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata  
**Chemical coordination and regulation:** i) Endocrine glands and their secretions  
ii) Functions of hormones secreted by endocrine glands  
**Human reproduction:** i) Parts of female reproductive system ii) Parts of male reproductive system iii) Spermatogenesis and Oogenesis iv) Menstrual cycle
- 4. Plants and mineral nutrition:** Essential mineral, macro and 05 hours  
micronutrients, Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation  
**Photosynthesis:** Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

5. **Plant respiration:** Respiration, glycolysis, fermentation (anaerobic). 04 hours  
**Plant growth and development:** Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators  
**Cell - The unit of life:** Structure and functions of cell and cell organelles. Cell division  
**Tissues:** Definition, types of tissues, location and functions.

**\*NUE – Non-University Examination**

### **Text Books**

- a. Text book of Biology by S. B. Gokhale
- b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

### **Reference Books**

- a. A Text book of Biology by B.V. Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthkrishnan.
- e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

## **BP112RBP.REMEDIAL BIOLOGY PRACTICAL\***

**Max. Marks: 15**

**2 Hours/week  
Exam. hours: 02**

1. Introduction to experiments in biology a) Study of Microscope b) Section cutting techniques  
c) Mounting and staining d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

**\*NUE – Non-University Examination**





determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

3. **Differentiation** : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of  $x^n$  w.r.t  $x$ , where  $n$  is any rational number, Derivative of  $e^x$ , Derivative of  $\log_e x$ , Derivative of  $a^x$ , Derivative of trigonometric functions from first principles (**without Proof**), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application 06 hours
4. **Analytical Geometry Introduction**: Signs of the Coordinates, Distance formula, 06 hours  
**Straight Line** : Slope or gradient of a straight line, Conditions for parallelism & perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line  
**Integration**: Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application
5. **Differential Equations** : Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations 06 hours  
**Laplace Transform** : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, Application in solving Chemical kinetics and Pharmacokinetics equations

\*NUE – Non-University Examination

**Recommended Books (Latest Edition)**

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal

# INSTITUTE OF PHARMACEUTICAL SCIENCES, KURUKSHETRA UNIVERSITY KURUKSHETRA

## B.PHARMACY-II SEMESTER (2017-2018)

### BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II

**Scope :** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

**Objectives:** Upon completion of this course the student should be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

1. **Nervous system:** Organization of nervous system, neuron, neuroglia, 10 hours  
classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.  
Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity).
2. **Digestive system:** Anatomy of GI Tract with special reference to 06 hours  
anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large

intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

**Energetics:** Formation and role of ATP, Creatinine Phosphate and BMR.

3. **Respiratory system:** Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods. 10 hours
- Urinary system:** Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.
4. **Endocrine system:** Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders. 10 hours
5. **Reproductive system:** Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition 09 hours
- Introduction to genetics:** Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

## BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY-II PRACTICAL

**Max. Marks: 35**

**4 Hours/week**

**Exam. hours: 04**

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.

12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index.
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

#### **Recommended Books (Latest Editions)**

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
4. Text book of Medical Physiology- Arthur C, Guyton and John.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

#### **Reference Books:**

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterje, Academic Publishers Kolkata

### **BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I**

**Scope :** This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

**Objectives:** Upon completion of the course the student shall be able to

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

General methods of preparation and reactions of compounds superscripted with asterisk (\*) to be explained. To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences.

1.      **Classification, nomenclature and isomerism:** Classification of Organic Compounds, Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural isomerisms in organic compounds      07 hours
2.      **Alkanes\*, Alkenes\* and Conjugated dienes\***      10 hours  
 SP<sup>3</sup> hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP<sup>2</sup> hybridization in alkenes, E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement
3.      **Alkyl halides\*:** SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations. SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions. Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.      10 hours  
**Alcohols\*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol
4.      **Carbonyl compounds\* (Aldehydes and ketones)** Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.      10 hours

5. **Carboxylic acids\*** Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester, Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid 08 hours
- Aliphatic amines\*** - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

### **BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY-I PRACTICAL**

**Max. Marks: 35**

**4 Hours/week**

**Exam. hours: 04**

1. Systematic qualitative analysis of unknown organic compounds like
  - Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
  - Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
  - Solubility test
  - Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
  - Melting point/Boiling point of organic compounds
  - Identification of the unknown compound from the literature using melting point/ boiling point.
  - Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
  - Minimum 5 unknown organic compounds to be analysed systematically.
  - Preparation of suitable solid derivatives from organic compounds
2. Construction of molecular models

#### **Recommended Books (Latest Editions)**

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwalia/Chatwal.

## BP203 T. BIOCHEMISTRY

**Scope :** Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

**Objectives:** Upon completion of course student shall able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

1. **Biomolecules:** Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins. 08 hours  
**Bioenergetics:** Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP
2. **Carbohydrate metabolism:** Glycolysis – Pathway, energetics and significance, Citric acid cycle- Pathway, energetics and significance, HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency, Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance, Hormonal regulation of blood glucose level and Diabetes mellitus, 10 hours  
**Biological oxidation:** Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate level phosphorylation, Inhibitors ETC and oxidative phosphorylation/Uncouplers.

3. **Lipid metabolism:**  $\beta$ -Oxidation of saturated fatty acid (Palmitic acid), Formation and utilization of ketone bodies; ketoacidosis, De novo synthesis of fatty acids (Palmitic acid), Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D, Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.  
**Amino acid metabolism:** General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia), Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice. 10 hours
4. **Nucleic acid metabolism and genetic information transfer:** Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors. 10 hours
5. **Enzymes:** Introduction, properties, nomenclature and IUB classification of enzymes, Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples, Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation, Therapeutic and diagnostic applications of enzymes and isoenzymes, Coenzymes –Structure and biochemical functions. 07 hours

### **BP 209 P. BIOCHEMISTRY PRACTICAL**

**Max. Marks: 35**

**4 Hours/week**

**Exam. hours: 04**

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.



### Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.

### BP 204T.PATHOPHYSIOLOGY

**Scope :** Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

**Objectives:** Upon completion of the subject student shall be able to –

1. Describe the etiology and pathogenesis of the selected disease states;
2. Name the signs and symptoms of the diseases; and
3. Mention the complications of the diseases.

**THEORY**      **Max. Marks: 75**                      **Total hours: 45**                      **3 Hours/week**  
**Exam. hours: 03**

**Instructions to the paper-setter**      The question paper contains 3 Sections. **Section A** (compulsory) have 10 questions (2 marks each) carrying 20 marks. **Section B** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section C** have 9 questions (any seven, 5 marks each) carrying 35 marks.

**Instructions to Candidates**      Section A is compulsory. Attempt any **TWO** questions from Section B. Each Question carry 10 Marks. Attempt any **SEVEN** questions from Section C. Each Question carry 5 Marks.

1. **Basic principles of Cell injury and Adaptation:** Introduction, 10 hours definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra

cellular accumulation, Calcification, Enzyme leakage and Cell Death  
Acidosis & Alkalosis, Electrolyte imbalance.

**Basic mechanism involved in the process of inflammation and repair:** Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis.

2. **Cardiovascular System:** Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis) 10 hours  
**Respiratory system:** Asthma, Chronic obstructive airways diseases.  
**Renal system:** Acute and chronic renal failure.
3. **Haematological Diseases:** Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalassemia, hereditary acquired anemia, hemophilia 10 hours  
**Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones  
**Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.  
**Gastrointestinal system:** Peptic Ulcer
4. Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease. 08 hours  
**Disease of bones and joints:** Rheumatoid arthritis, osteoporosis and gout  
**Principles of cancer:** classification, etiology and pathogenesis of cancer  
**Diseases of bones and joints:** Rheumatoid Arthritis, Osteoporosis, Gout  
**Principles of Cancer:** Classification, etiology and pathogenesis of Cancer
5. **Infectious diseases:** Meningitis, Typhoid, Leprosy, Tuberculosis, Urinary tract infections 08 hours  
**Sexually transmitted diseases:** AIDS, Syphilis, Gonorrhoea

#### **Recommended Books (Latest Editions)**

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore; 1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice

- of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
  8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
  9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
  10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

### Recommended Journals

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online).
5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

### BP205 T. COMPUTER APPLICATIONS IN PHARMACY\*

**Scope :** This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

**Objectives:** Upon completion of the course the student shall be able to

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

**THEORY**      **Max. Marks: 50**                      **Total hours: 30**                      **2 Hours/week**  
**Exam. hours: 02**

**Instructions to the paper-setter**      The question paper contains 2 Sections. **Section A** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section B** have 8 questions (any six, 5 marks each) carrying 30 marks.

**Instructions to Candidates**      Attempt any **TWO** questions from Section A. Each Question carry 10 Marks. Attempt any **SIX** questions from Section B. Each Question carry 5 Marks.

1. **Number system:** Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One’s complement, Two’s complement method, binary multiplication, binary division      06 hours
- Concept of Information Systems and Software:** Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle,

planning and managing the project

2. **Web technologies:** Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database 06 hours
3. **Application of computers in Pharmacy** – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System 06 hours
4. **Bioinformatics:** Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery. 06 hours
5. **Computers as data analysis in Preclinical development:** Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS). 06 hours

\*NUE – Non-University Examination

#### **BP210P. COMPUTER APPLICATIONS IN PHARMACY PRACTICAL\***

**Max. Marks: 15**

**2 Hours/week**

**Exam. hours: 02**

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard , generating label in MS WORD
5. Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

\*NUE – Non-University Examination

### Recommended Books (Latest Editions)

1. Computer Application in Pharmacy – William E. Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C. Rastogi -CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002.

### BP 206 T. ENVIRONMENTAL SCIENCES\*

**Scope :** Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

**Objectives:** Upon completion of the course the student shall be able to:

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

**THEORY**      **Max. Marks: 50**                      **Total hours: 30**                      **2 Hours/week**  
**Exam. hours: 02**

**Instructions to the paper-setter**      The question paper contains 2 Sections. **Section A** have 3 questions (any two, 10 marks each) carrying 20 marks. **Section B** have 8 questions (any six, 5 marks each) carrying 30 marks.

**Instructions to Candidates**      Attempt any **TWO** questions from Section A. Each Question carry 10 Marks. Attempt any **SIX** questions from Section B. Each Question carry 5 Marks.

1. The Multidisciplinary nature of environmental studies, Natural Resources Renewable and non-renewable resources: Natural resources and associated problems a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of 10 hours

natural resources.

2. Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem. Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) 10 hours
3. Environmental Pollution: Air pollution; Water pollution; Soil pollution. 10 hours

**\*NUE – Non-University Examination**

**Recommended Books (Latest Editions)**

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clarendon Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment.

**Bachelor of Technology (Computer Science & Engineering)  
Credit Based Scheme of Studies/Examination  
Semester VII**

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule				Duration of Exam (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	CSE 401	Unix & Linux Programming	4:0:0	4	4.0	75	25	0	100	3
2	CSE 403	Computer Graphics and Animation	4:0:0	4	4.0	75	25	0	100	3
3	PE-I	Elective* – I	3:0:0	3	3.0	75	25	0	100	3
4	PE-II	Elective* – II	3:0:0	3	3.0	75	25	0	100	3
5	CSE 405	Computer Graphics Lab	0:0:2	2	1.0	0	40	60	100	3
6	CSE 407	Project-1**	0:0:8	8	4.0	0	100	100	200	3
7	CSE 409	Unix & Linux Programming Lab	0:0:2	2	1.0	0	40	60	100	3
8	CSE 411	Seminar	0:0:2	2	1.0	0	100	0	100	
9	CSE 413	Industrial Training (Viva-Voce)***					100	0	100	
		<b>Total</b>		<b>28</b>	<b>21.0</b>	<b>300</b>	<b>480</b>	<b>220</b>	<b>1000</b>	

Code	PE-I	Code	PE-II
CSE-415	Object Oriented Software Engineering	CSE-421	Agile Software Engineering
CSE-417	Cyber Security	CSE-423	Big Data and Analytics
CSE-419	Cryptography & Information Security	CSE-425	Expert Systems

**Note:**

\*The students will choose any two departmental electives courses out of the given elective list in 7<sup>th</sup> Semester.

\*\*Project should be initiated in 7<sup>th</sup> semester beginning, and should be completed by the end of 8<sup>th</sup> semester with good Report and power-point Presentation etc.

\*\*\*4-6 weeks hand on training to be done after 7<sup>th</sup> Semester Exams.

CSE-401 Unix & Linux Programming							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
4	0	0	4	75	25	100	3 Hrs.
<b>Purpose</b>	<b>Introduces commands and numerous programming concepts and application domains to cover important topics for implementation of the Unix programming concepts.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To learn basic and advanced Unix Commands.						
<b>CO2</b>	Expose the role of filters and file compression techniques.						
<b>CO3</b>	To explore knowledge of programming language development tools.						
<b>CO4</b>	To expand knowledge of Unix/Linux system administration and networking.						

### Unit I: Basic Command Usage

Linux Startup: User accounts, accessing Linux - starting and shutting processes, Logging in and Logging out, Unix commands like zip, unzip, pack, unpack, compress, uncompress, Shell Programming, Unix file system: Linux/Unix files, i-nodes and structure, file system related commands, Shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment

### Unit II: Filters and File Compression

Regular Expressions and Filters: Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to grep, egrep, sed, programming with awk and perl, File Compression Techniques: data redundancy elimination using fingerprint generation deduplication and data similarities removal using delta techniques for data reduction storage, parallel compression with Xdelta utility.

### Unit III: Program Development Tools

The C Environment: C compiler, vi editor, compiler options, managing projects, memory management, use of makefile, cmake, dependency calculations, memory management – static and dynamic memory, static and dynamic libraries, dynamic loader, debugging tools like gdb, fixed-size and variable-size blocks of data files chunks divisor chunking techniques like Frequency Based Chunking and Content Defined Chunking Unix based open source coding.

### Unit IV: Process Control

Processes in Linux: Processes, starting and stopping processes, initialization processes, rc and init files, job control - at, batch, cron, time, network files, security, privileges, authentication, password administration, archiving, Signals and signal handlers, Threading, Linux I/O system, Networking tools like ping, telnet, ftp, route, Firewalls, Backup and Restore tar, cpio, dd.

Case Study: PCOMPRESS open source free software

#### Text Books:

1. John Goerzen: Linux Programming Bible, IDG Books, New Delhi, 2014.
2. Sumitabha Das: Unix – Concept and Applications, Fourth Edition TMH, 2015.
3. Neil Matthew, Richard Stones: Beginning Linux Programming, 4<sup>th</sup>. Edition, Wrox-Shroff, 2011.
4. Welsh & Kaufmann: Running Linux, O'Reiley & Associates, 2013.

#### Reference Book:

1. B.M. Harwani, *Unix and Shell Programming*, Oxford University Press, 2013.



<b>CSE-403 Computer Graphics and Animation</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Major Test</b>	<b>Minor Test</b>	<b>Total</b>	<b>Time</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>75</b>	<b>25</b>	<b>100</b>	<b>03 Hrs.</b>
<b>Purpose</b>	<b>Introduces Computer Graphics that help in designing different kinds of static and movable objects.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Explore the background and standard line and circle drawing algorithms.						
<b>CO2</b>	Exposure of various transformation approaches and its comparative analysis.						
<b>CO3</b>	Illustrate Projection and clipping with explore different techniques.						
<b>CO4</b>	Apply design principles to create different curves and explore hidden lines and surface techniques.						

### **Unit 1**

Computer Graphics applications, Display Devices, Point & Positioning Devices, Plotting Techniques for point and Line, Line drawing algorithms: DDA, Bresenham's Circle drawing algorithms, Filled area algorithms: Scan line, Polygon filling algorithms, Boundary filled algorithms.

### **Unit-2**

Window to view port transformation, Window to view port mapping, Two Dimensional transformation: translation, scaling, rotation, reflection and Shear, Homogeneous Coordinate system.

3-D transformation: Rotation, Shear, translation, Numerical Problems of transformation viewing pipeline.

### **Unit-3**

Clipping: Point & Line clipping algorithm, 4-bit code algorithm, Cohen-Sutherland Line clipping algorithms, Liang-Barsky line clipping algorithms. Polygon clipping: Sutherland-Hodgeman Polygon clipping algorithm. Curve clipping, Text clipping.

Projection: Parallel, Perspective, Vanishing Points.

### **Unit-4**

Representation of 3-D Curves and Surfaces: interpolation and approximation alines, parametric conditions, Geometric continuity conditions, Beizer curves and surfaces: properties of beizer curves, beizer surfaces.

Hidden Surfaces removal: Hidden surface elimination, depth buffer algorithm, scan line coherence and area coherence algorithm, priority algorithm

### **Text Books**

1. Donald Hearn & M.Pauline Baker, Computer Graphics, 2nd Edition, Pearson Education.
2. William M. Newmann & Robert F. Sproull, Principles of Interactive Computer Graphics, Tata McGraw-Hill Second Edition, New Delhi, India.
3. Zhigang Xiang & Roy A Plastock , Computer Graphics, Second Edition, Schaum's Outline, Tata McGraw Hill Education Private Limited, New Delhi, India.

### **References Book**

1. Foley, van Dam, Feiner, and Hughes. Computer Graphics: Principles and Practice, 3rd edition in C.

CSE-415	Object Oriented Software Engineering						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	<b>To provide the thorough knowledge to use the concepts and their design attributes for Object Oriented Software Engineering approaches and platforms to solve real time problems.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To learn the basic concepts of object oriented systems and software engineering.						
<b>CO2</b>	To get exposure of various object modeling methodologies, tools for analyzing and designing software based systems using UML.						
<b>CO3</b>	To explore problems using Use Cases, analyzing relations, responsibilities and collaborations among classes and their behavior in problem domain.						
<b>CO4</b>	To evaluate object oriented design processes using models, design patterns, interfaces designs and communication mechanisms for performing required tasks.						

#### Unit - I

An Overview of Object-Oriented system Development, Objects Basis, Class Hierarchy, Inheritance, Polymorphism, Object Relationships and Associations, Aggregations and Object Containment, Object Persistence, Meta-Classes, Object Oriented Systems Development Life Cycle: Software Development Process, Object Oriented Systems Development: A Use-Case Driven Approach.

#### Unit - II

Object Oriented Methodologies: Rumbaugh Methodology, Jacobson Methodology, Booch Methodology, Patterns, Frameworks, The Unified approach, Unified Modeling Language (UML)

#### Unit - III

Object Oriented Analysis Process, Use Case Driven Object Oriented Analysis, Use Case Model, Object Analysis: Classification, Classification Theory, Approaches for identifying classes, Responsibilities and Collaborators, Identifying Object Relationships, Attributes and Methods: Associations, Super-Sub Class relationships, A-Part-of-Relationships-Aggregation, Class Responsibilities, Object Responsibilities.

#### Unit - IV

Object Oriented Design process and Design Axioms, Corollaries, Design Patterns, Designing Classes: Object Oriented Design Philosophy, UML Object Constraint Language, Designing Classes: The Process, Class Visibility, Refining Attributes, Designing Methods and Protocols, Packages and Managing classes, View Layer: Designing Interface objects, Designing View layer Classes, Macro and Micro Level Interface Design Process.

#### TEXT BOOKS:

1. Ali Bahrami, Object Oriented Systems Development, McGraw Hill Publishing Company Limited, New Delhi, 2013.
2. Rumbaugh *et al.*, Object Oriented Modeling and Design, PHI, 2006.
3. Robert Laganière and Timothy C. Lethbridge, Object-Oriented Software Engineering: Practical Software Development, McGraw-Hill Publishing Company Limited, New Delhi, Sixth Print 2008.

#### REFERENCE BOOKS:

1. Ivar Jacobson, Magnus Christerson, Patrick Jonsson, Gunnar Overgaard, Object-oriented Software Engineering: A Use Case Driven Approach, Pearson Education, New Delhi, Seventh Edition Reprint, 2009.

2. David C. Kung, Object-Oriented Software Engineering: An Agile Unified Methodology,

CSE-417 Cyber Security							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	-	-	3	75	25	100	3 Hrs.
<b>Purpose</b>	To gain a broad understanding in order to get predictive ways out related to cyber security.						
<b>Course Outcomes</b>							
<b>CO1</b>	To facilitate the basic knowledge of cyber security.						
<b>CO2</b>	To explore and sort issues related to different types of activities in cyber crime.						
<b>CO3</b>	To get enable to fix the various cyber attacks.						
<b>CO4</b>	To deal with the digital forensics and related scenarios of cyber crimes.						

McGraw-Hill Publishing Company Limited, New Delhi, 2013.

3. Bernd Bruegge, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java: Pearson New International, Third Edition, 2013.

#### Unit I

**Introduction:** Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: crime against individual, Crime against property, Cyber extortion, Drug trafficking, cyber terrorism.

Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

#### Unit 2

**Cyber Crime Issues:** Unauthorized Access to Computers, Computer Intrusions, Viruses and Malicious Code, Internet Hacking and Cracking, Virus and worms, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Password Cracking, Steganography, Key loggers and Spyware, Trojan and backdoors, phishing, DOS and DDOS attack, SQL injection, Buffer Overflow.

#### Unit 3

**Introduction to cyber attacks:** passive attacks, active attacks.

Cyber crime prevention methods, Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control, Hardware protection mechanisms, OS Security

#### Unit 4

**Digital Forensics:** Introduction to Digital Forensics, historical background of digital forensics, Forensic Software and Hardware, need for computer forensics science, special tools and techniques digital forensic life cycle, challenges in digital forensic.

**Law Perspective:** Introduction to the Legal Perspectives of Cybercrimes and Cyber security, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws, The Indian IT Act, Cybercrime Scenario in India, Digital Signatures and the Indian IT Act, Cybercrime and Punishment.

#### TEXT BOOKS:

1. Nelson Phillips and Enfinger Stuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

#### REFERENCE BOOKS:

1. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005.
2. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt. Ltd.

<b>CSE-419</b>							
<b>Cryptography and Information Security</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Major Test</b>	<b>Minor Test</b>	<b>Total</b>	<b>Time</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>75</b>	<b>25</b>	<b>100</b>	<b>3 Hrs.</b>
<b>Purpose</b>	The course will be useful for students who plan to do research/product development/analysis in areas related to secure computing in their career.						
<b>Course Outcomes (CO)</b>							
CO1	To learn basics of network security and cryptography.						
CO2	Exposing the knowledge about network authentication mechanism, with security algorithms.						
CO3	To explore the knowledge of key exchange protocols.						
CO4	To realize the effect on digitized security.						

### **Unit 1: Basics of Cryptography**

Introduction to cryptography, security threats, types of cryptography, Classical cryptography and their cryptanalysis, perfect secrecy, Shannon's theorem, stream ciphers, Security attacks

### **Unit 2: Authentication Mechanism and Security Algorithms**

Access control mechanism, Discretionary v/s mandatory access control, CPA-secure encryption, Pseudorandom permutations, practical block ciphers (3-DES, AES), RSA, modes of operation, MACs, Hash functions-Tiger Hash, Gear hash, pseudorandom generators, Public key infrastructure.

### **Unit 3: Key Exchange Protocols**

CCA-secure encryption, Diffie-Hellman key exchange, Public key crypto systems (El Gamal, Paillier, Rabin, Goldwasser-Micali), Key exchange protocols, example protocol such as PGP, Kerberos, IPSEC/VPN, SSL, S/MIME etc., PKCSv1.5.

### **Unit 4: Digitized Security**

Digital signatures, MD5, SHA1, Rabin Finger Print, digital certificates, DSS, firewall and intrusion detection systems, Byzantine agreement, secure multiparty computation, interactive proof systems

#### **Text Books:**

1. Y. Lindell and J. Katz. Introduction to Modern Cryptography. MIT press, 2012.
2. OedGoldreich. Foundations of Modern cryptography: Parts I and II, Cambridge Press, 2011.
3. A. Menezes, P.C. Van Oorschot and S.A. Vanstone. Handbook of Applied Cryptography, CRC Press, 2010.
4. William Stallings, Cryptography and Network Security: Pearson Education, 2013.

#### **Reference Books:**

1. Michael EWhitman & Herbert J. Mattord, Principles of Information Security, Vikash Publishing House PVT. LTD., New Delhi, 2015.
2. Charles P. Pfleeger, Security in Computing, 4<sup>th</sup> Edition, Prentice Hall, 2011.
3. Jeff Crume, Inside Internet Security Addison Wesley, 2014.

Agile Software Engineering								
CSE-421	Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
	3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	<b>Introduces the business value of adopting Agile approaches and provide complete understanding of the Agile development practices</b>							
<b>Course Outcomes (CO)</b>								
<b>CO1</b>	Understand the background and driving forces for taking an Agile approach to software development.							
<b>CO2</b>	Understand the business value of adopting Agile approaches.							
<b>CO3</b>	Drive development with unit tests using Test Driven Development.							
<b>CO4</b>	Apply design principles and refactoring to achieve Agility.							

### **Unit I: Fundamentals of Agile**

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

### **Unit II: Agile Scrum Framework**

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

### **Unit III: Agile Testing**

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

### **Unit IV: Agile Software Design and Development**

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

#### **Text Books:**

1. Ken Schawber, Mike Beedle, *Agile Software Development with Scrum*, Pearson publications.
2. Robert C. Martin, *Agile Software Development, Principles, Patterns and Practices*, Prentice Hall.
3. Lisa Crispin, Janet Gregory, *Agile Testing: A Practical Guide for Testers and Agile Teams*, Addison Wesley.

#### **Reference Books:**

1. Alistair Cockburn, *Agile Software Development: The Cooperative Game*, Addison Wesley.
2. Mike Cohn, *User Stories Applied: For Agile Software*, Addison Wesley.

CSE-423 Big Data and Analytics							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	<b>To provide knowledge of Big Data Analytics and Distributed File Systems.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To learn in details the concepts of big data.						
<b>CO2</b>	Expose the criteria of big data analytics and big data storage.						
<b>CO3</b>	To explore knowledge of big data compression techniques.						
<b>CO4</b>	To explore learning of big data tools and state-of-the-art knowledge with implementation for big data.						

### Unit I: Big Data Background

Big data definition and features of big data, big data value, development of big data, challenges of big data, NoSQL databases, technologies related to big data including cloud computing, Internet of Things, data center, Hadoop, relationship between IoT and big data, relationship between hadoop and big data, big data generation and acquisition includes data collection, data transmission, data pre-processing, big data applications.

### Unit II: Big Data Analytics and Storage

Big data analysis, big data analytic methods and tools, Pig, Hive, Flume, Mahout, Big data storage, distributed storage system for massive data, storage mechanism for big data GFS, HDFS, HBase, MongoDB, Cassandra, big data storage deduplication techniques, fixed-size and variable-size blocks based deduplication, content defined chunking, frequency based chunking, byte and multi-byte indexing techniques, Cloud storage.

### Unit III: Big Data Compression

Big data delta compression, Xdelta implementation, Message Digest (MD5), Secure Hash Algorithm (SHA-1/SHA-256), Gear Hash, Tiger Hash, Rabin and Incremental Secure Fingerprint based deduplication, lossless duplicate and similar data elimination approaches, Parallel deduplication and compression using PCOMPRESS, Scalable Decentralized Deduplication Store (SDDS) using Cassandra.

### Unit IV: Big Data Processing

Installation procedure with system requirements for Apache Hadoop, Cassandra, Spark, Pig, Hive, HBase, MongoDB large scale distributed storage systems, Map Reduce programming model working, YARN architecture, Apache Pig and Hive architecture, Single node and Multi-nodes Hadoop Cluster Set up and running a Big Data example, NoSQL implementation.

#### Text Books:

1. "Big Data" by Viktor Mayer-Schönberger, Kenneth Cukier, ISBN:978-0544002692, Eamon Dolan/Houghton Mifflin Harcourt 2013.
2. "Big Data Now", by O'Reilly Media Inc., ASIN: B0097E4EBQ, O'Reilly 2012.
3. "Hadoop Operation", by Eric Sammer, ISBN: 978-1449327057, O'Reilly 2012.
4. "MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems", by Donald Miner, Adam Shook, ISBN:978-1449327170, O'Reilly 2012.

#### Reference Books:

1. "Programming Hive", by Edward Capriolo, ISBN: 978-1449319335, O'Reilly 2012.
2. "HBase: the Definitive Guide", by Lars George, ISBN: 978-1449396107, O'Reilly 2011.
3. "Mahout in Action", by Sean Owen, Robin Anil, Ted Dunning, Ellen Friedman, ISBN: 978-1935182689, Manning 2011.
4. "Programming Pig", by Alan Gates, ISBN: 978-1449302641, O'Reilly 2011.
5. "Cassandra, the Definitive Guide", by Eben Hewitt ISBN: 978-1449390419 O'Reilly 2011.
6. "MongoDB: The Definitive Guide" by Kristina Chodorow, Michael Dirolf, ISBN: 978-1449381561, O'Reilly, 2010.

CSE-425		Expert Systems					
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	In this course the student will learn the methodologies used to transfer the knowledge of a human expert into an intelligent program that can be used to solve real-time problems.						
<b>Course Outcomes(CO)</b>							
<b>CO1</b>	Examining the fundamentals and terminologies of expert system.						
<b>CO2</b>	To facilitate students to implement various knowledge representation techniques for acquisition and validate various structures in experts system domain.						
<b>CO3</b>	Signifying AI techniques to solve social, industrial and environmental problems.						
<b>CO4</b>	Application of professional aspects in multi-disciplinary approach to meet global standards towards design, realizing and manufacturing.						

### Unit-1

Introduction to AI programming languages, Blind search strategies, Breadth first – Depth first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO\* algorithm – game trees, Min-max algorithms, game playing – Alpha beta pruning.  
 Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules based deduction systems.

### Unit-2

Introduction to Expert Systems, Architecture of expert system, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.  
**Expert System Tools:** Techniques of knowledge representations in expert systems, knowledge engineering, System-building aids, support facilities, stages in the development of expert systems.

### Unit-3

**Building an Expert System:** Expert system development, Selection of tool, Acquiring Knowledge, Building process.

### Unit-4

**Problems with Expert Systems:** Difficulties, common pitfalls in planning, dealing with domain expert, difficulties during development.

### TEXT BOOKS

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, New Delhi, 2008.
2. Waterman D.A., "A Guide to Expert Systems", Addison Wesley Longman, 1985.

### REFERENCE BOOKS

1. Stuart Russel and other Peter Norvig, "Artificial Intelligence – A Modern Approach", Prentice Hall, 1995.
2. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley, 1979.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat and Waterman: Building Expert Systems, Addison Wesley, 1983.
5. Weiss S.M. and Kulikowski C.A., "A Practical Guide to Designing Expert Systems", Rowman & Allanheld, New Jersey, 2011.

<b>CSE-405 Computer Graphics Lab</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Minor Test</b>	<b>Practical</b>	<b>Total</b>	<b>Time</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>3Hrs.</b>
<b>Purpose</b>	<b>To Design and implement various Line and Circle Drawing Algorithms.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To Implement basic algorithms related to Line & Circle Drawing.						
<b>CO2</b>	Implement various Line & Circle Drawing Algorithms.						
<b>CO3</b>	Hands on experiments on 2-D transformations.						
<b>CO4</b>	Conceptual implementation of Clipping and other drawing algorithms..						

### **List of Practicals**

1. Write a program to implement DDA line drawing algorithm.
2. Write a program to implement Bresenham's line drawing algorithm.
3. Implement the Bresenham's circle drawing algorithm.
4. Write a program to draw a decagon whose all vertices are connected with every other vertex using lines.
5. Write a program to move an object using the concepts of 2-D transformations.
6. Write a program to implement the midpoint circle drawing algorithm any Object Oriented Programming Language like Python, C++, Java.
7. Implement the line clipping algorithm using any Object Oriented Programming Language like Python, C++, Java.
8. Implement boundary fill algorithm using any Object Oriented Programming Language like Python, C++, Java.
9. Implement the depth buffer algorithm using any Object oriented language like Python, C++, Java.
10. Perform the Polygon Clipping Algorithm using any Object oriented language like Python, C++, Java.
11. Draw a Rectangle using Bresenham's and DDA Algorithm using any Object oriented language like Python, C++, Java.



<b>CSE-409</b>							
<b>Unix &amp; Linux Programming Lab</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Minor Test</b>	<b>Practical</b>	<b>Total</b>	<b>Time</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>3 Hrs.</b>
<b>Purpose</b>	<b>To provide experimental knowledge of Unix &amp; Linux Programs</b>						
<b>Course Outcomes (CO)</b>							
<b>CO</b>	Exploring knowledge by implementation of programs using UNIX/LINUX.						

### List of Practicals

1. Familiarize with Unix/Linux logging/logout and simple commands.
2. Familiarize with vi editor.
3. Using Bash shell develop simple shell programs.
4. Develop advanced shell programs using grep, fgrep & egrep.
5. Compile and debug various C programs using different options.  
Content defined chunking, frequency based chunking, delta/Xdelta, Rabin Fingerprint Generator, Parallel Compression pcompress.
6. Learning of installation and upgradation of Linux operating system.
7. Install Linux on a PC having some other previously installed operating system. All OSs should be usable.
8. As supervisor create and maintain user accounts, learn package installation, taking backups, creation of scripts for file and user management, creation of startup and shutdown scripts using at, cron etc.

**Note: At least 5 to 10 more exercises are to be given by the teacher concerned.**

**Bachelor of Technology (Computer Science & Engineering)**  
**Credit Based Scheme of Studies/Examination**  
**Semester VIII**

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule				Duration of Exam (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	CSE 402	Neural Networks & Fuzzy Logic	4:0:0	4	4.0	75	25	0	100	3
2	PE-III	Elective* - III	4:0:0	4	4.0	75	25	0	100	3
3	PE-IV	Elective* - IV	4:0:0	4	4.0	75	25	0	100	3
4	CSE 404	Mobile Apps Development	4:0:0	4	4.0	75	25	0	100	3
5	CSE 406	Mobile Apps Development Lab	0:0:2	2	1.0	0	40	60	100	3
6	CSE 408	Computer Hardware & Troubleshooting Lab	0:0:2	2	1.0	0	40	60	100	3
7	CSE 410	Project-II	0:0:16	16	8.0	0	100	100	200	3
		<b>Total</b>		<b>36</b>	<b>26.0</b>	<b>300</b>	<b>280</b>	<b>220</b>	<b>800</b>	
8	CSE 424	General Fitness & Professional Aptitude**					100		100	8

Code	PE-I	Code	PE-II
CSE-412	Software Testing	CSE-418	Parallel Computing
CSE-414	Graph Theory	CSE-420	Cloud Computing
CSE-416	Data Mining	CSE-422	Natural Language Processing

**Note:**

\*The students will choose any two departmental electives courses out of the given elective list in VIII Semester.

\*\*CSE 424 will be non credit subject and only grade will be awarded to student based on his/her performance in the examination.

<b>CSE-402</b>							
<b>Neural Networks &amp; Fuzzy Logic</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Major Test</b>	<b>Minor Test</b>	<b>Total</b>	<b>Time</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>75</b>	<b>25</b>	<b>100</b>	<b>3 Hrs.</b>
<b>Purpose</b>	<b>To provide knowledge of various artificial neural networks, fuzzy logic techniques and Genetic Engineering approach for optimization</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To learn the basics of artificial neural networks concepts.						
<b>CO2</b>	Expose detailed explanation of various neural networks architecture.						
<b>CO3</b>	To explore knowledge of special types of Artificial neural networks.						
<b>CO4</b>	To explore fuzzy logic techniques and genetic algorithms in neural networks.						

### **Unit I: Fundamentals of Artificial Neural Networks**

Introduction: Concepts of neural networks, Characteristics of Neural Networks, Applications of Neural Networks. Fundamentals of Neural Networks: The biological prototype, Neuron concept, Single layer Neural Networks, Multi-Layer Neural Networks, terminology, Notation and representation of Neural Networks, Training of Artificial Neural Networks. Representation of perceptron, perceptron learning and training, Classification, linear Separability

### **Unit II: Neural Networks**

Hopfield nets: Structure, training, and applications, Back Propagation: Concept, Applications and Back Propagation Training Algorithms. Counter Propagation Networks: Kohonan Network, Grossberg Layer & Training, applications of counter propagation, Image classification. Bi-directional Associative Memories: Structure, retrieving a stored association, encoding associations.

### **Unit III: Special Neural Networks**

ART: ART architecture, ART classification operation, ART implementation and characteristics of ART. Image Compression Using ART, Optical Neural Networks: Vector Matrix Multipliers, Hop field net using Electro optical matrix multipliers, Holographic correlator, Optical Hopfield net using Volume Holograms, Cognitrons and Neocognitrons: structure and training.

### **Unit IV: Fuzzy Logic**

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Genetic Algorithms: genetic algorithm implementation in problem solving and working of genetic algorithms evolving neural networks, Differential Evolution optimization for engineering problems.

#### **Text Books:**

1. Li Min Fu, "Neural Networks in Computer Intelligence", McGraw-Hill, Inc. 2012.
2. S N Sivanandam, "Neural Networks using MATLAB 6.0", TMH, 4<sup>th</sup>. Reprint 2015.
3. S N Sivanandam, "Principles of Soft Computing", 2<sup>nd</sup>. Edition, Wiley, Reprint 2014.

#### **Reference Books:**

1. Simon Haykin, "Neural Networks: A Comprehensive Foundations", Prentice-Hall International, New Jersey, 2013.
2. Freeman J.A. & D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison Wesley, Reading, Mass, 2014.

CSE-412		Software Testing					
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
4	0	0	4	75	25	100	3 Hrs.
<b>Purpose</b>	To provide an understanding of concepts and techniques for testing software and assuring its quality.						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Expose the criteria and parameters for the generation of test cases.						
<b>CO2</b>	Learn the design of test cases and generating test cases.						
<b>CO3</b>	Be familiar with test management and software testing activities.						
<b>CO4</b>	Be exposed to the significance of software testing in web and Object orient techniques.						

#### UNIT – I

**Introduction:** Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference between Verification and Validation, What is software testing and why it is so hard? Test Cases, Test Oracles, Testing Process, Limitations of Testing.

#### UNIT - II

**Functional Testing:** Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

**Structural Testing:** Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

#### UNIT - III

**Reducing the number of test cases:** Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, and Slice based testing

**Testing Activities:** Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

#### UNIT - IV

**Object oriented Testing:** Definition, Issues, Class Testing, Object Oriented Integration and System Testing.

**Testing Web Applications:** What is Web testing?, User interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing.

#### TEXT BOOKS:

1. Naresh Chauhan "Software Testing Principles and Practices" Oxford Publications, 2012.
2. Louise Tamres, "Software Testing", Pearson Education Asia, 2002.
3. Robert V. Binder, "Testing Object-Oriented Systems-Models, Patterns and Tools", Addison Wesley, 1999.
4. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.

#### REFERENCE BOOKS:

1. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
2. K.K. Aggarwal & Yogesh Singh, "Software Engineering", 2<sup>nd</sup> Ed., New Age International Publishers, New Delhi, 2005.
3. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
5. Gopalaswamy Ramesh, Srinivasan Desikan, Software Testing : Principles and Practices, Pearson India, 2005.

CSE-414 Graph Theory							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
4	0	0	4	75	25	100	3Hrs.
<b>Purpose</b>	<b>To familiarize the students with the fundamentals of Graph Theory and Graph algorithms.</b>						
<b>Course Outcomes</b>							
<b>CO1</b>	To get enabled about the various concepts of graph theory.						
<b>CO2</b>	To explore different trees, graphs and algorithms.						
<b>CO3</b>	To deal with the concept of planar graph and its related algorithms.						
<b>CO4</b>	To implement the concept of vectors, colouring, covering and partitioning of a graph.						

#### UNIT- I

**Introduction :** Graphs, Isomorphism, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, directed graphs, types of directed graphs, Euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.

#### UNIT- II

**Trees:** Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms.

#### UNIT- III

**Fundamentals of Cut sets:** Cut sets Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets, connectivity and separability, network flows.

**Planar Graphs:** Planer graphs, different representation of a planar graph, combinatorial and geometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.

#### UNIT- IV

**Vector:** Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix.

**Graph Colouring, covering and partitioning:** Colouring, covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem.

#### **Text Books:**

1. Deo, N, Graph theory with applications to Engineering and Computer Science, PHI.
2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, TMH.

#### **Reference Books:**

1. Robin J. Wilson, Introduction to Graph Theory, Pearson Education.
2. Harary, F, Graph Theory, Narosa Publication.
3. Bondy and Murthy: Graph theory and application. Addison Wesley.
4. V. Balakrishnan, Schaum's Outline of Graph Theory, TMH.
5. Geir Agnarsson, Graph Theory: Modeling, Applications and Algorithms, Pearson Education.

CSE-416	Data Mining						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
4	0	0	4	75	25	100	3 Hrs.
<b>Purpose</b>	<b>To provide the knowledge of data mining and its techniques.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To learn data mining concepts in details.						
<b>CO2</b>	Expose the criteria for data generalization.						
<b>CO3</b>	To explore knowledge of mining associations, correlations and classification.						
<b>CO4</b>	To evaluate various types of data mining.						

### **Unit I: Data Mining and Data Preprocessing**

Introduction : Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction. Data Warehouse: Need for Data Warehousing, Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

### **Unit II: Data Generalization**

Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance, Mining descriptive statistical measures in large databases, Data deduplication methodologies.

### **Unit III: Mining Associations and Correlations**

Mining association rules in large databases: Association rule mining, Mining single dimensional boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction, Data redundancy detection and elimination techniques.

### **Unit IV: Cluster Analysis and Mining**

Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Mining time series and sequence data, Mining text databases, Mining World Wide Web, Data Chunking Techniques.

#### **Text Books**

1. J.Han, M.Kamber, Data Mining: Concepts and Techniques, Academic Press, Morgan Kaufman Publishers, 2015.
2. Pieter Adrians, Dolf Zantinge, Data Mining, Addison Wesley 2013.
3. C.S.R. Prabhu, Data Ware housing: Concepts, Techniques, Products and Applications, Prentice Hall of India, 2014.

#### **Reference Books**

1. Berry and Lin off, Mastering Data Mining: The Art and Science of Customer Relationship Management, John Wiley and Sons, 2012.
2. Seidman, Data Mining with Microsoft SQL Server, Prentice Hall of India, 2016.

CSE-418	Parallel Computing						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	<b>To enable students to compare various architectural taxonomies and design paradigms of parallel computers and computational models, parallelism approaches, performance metrics and techniques to parallelize and schedule loops and their programming constructs.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Classify various synchronous and asynchronous paradigms of parallel computing as well as identify some of the taxonomies for architectural classification of parallel computers.						
<b>CO2</b>	Compare various parallel computation models and approaches and describe different performance metrics in parallel computers.						
<b>CO3</b>	Distinguish shared memory and distributed memory multiprocessors and explain various parallel programming models and relative advantages and disadvantages of interconnection networks based on network parameters for reliable connections and achieving efficient speed.						
<b>CO4</b>	Examine various techniques of parallelizing loops and sequential programs and scheduling.						

#### Unit-I

**Introduction:** The state of computing, system attributes to performance, Paradigms of parallel computing: Synchronous – Vector/ Array, SIMD, systolic, Asynchronous- MIMD, reduction paradigm.

**Hardware Taxonomy:** Flynn's classification, Feng's classification, handler's classification.

**Software taxonomy:** Kung's taxonomy.

#### Unit-II

**Abstract parallel computational models:** combinational circuits, sorting network, PRAM models, VLSI complexity model, Interconnections RAMs, Parallelism approaches- data parallelism, control parallelism, Conditions of parallelism: Data, control and resource dependencies, Hardware and software parallelism.

**Performance metrics:** Laws governing performance measurements, Metrics- speedups, efficiency, utilization, communication overheads, single/ multiple program performances.

#### Unit-III

**Parallel processors:** taxonomy and topology: shared memory multi processors, distributed memory multicomputer, static and dynamic interconnections.

**Parallel programming:** shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and data flow programming.

#### Unit-IV

**Scheduling and parallelization:** Loop parallelization and pipelining-Loop transformation theory, parallelization and wave fronting, tiling and localization, software pipelining, Scheduling parallel programs, program partitioning and scheduling: Grain size, latency, grain packing and scheduling, loop scheduling, Parallelization of sequential programs.

#### Text Books

1. Kai Hwang and Naresh Jotwani, Advanced Computer Architecture, Second Edition, McGraw Hill, New Delhi, India, 2012.
2. M.J. Quinn, Parallel Computing: Theory and Practice, Second Edition, McGraw Hill, New Delhi, India, 2008.
3. D.Sima, T.Fountain, P.Kasuk, Advanced Computer Architecture-A Design space Approach, Pearson Education, India, 2009.

#### Reference Books

1. J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative approach, 5<sup>th</sup> Edition, Morgan Kaufmann/Elsevier-India.
2. T.G.Lewis, Parallel Programming: A machine Independent approach, IEEE Computer Society Press, Los Alamitos, 1994.

3. T.G.Lewis and H. El-Rewini, Introduction to parallel computing, Prentice Hall, New Jersey, 1998.

<b>CSE-420</b>							
<b>Cloud Computing</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Major Test</b>	<b>Minor Test</b>	<b>Total</b>	<b>Time</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>75</b>	<b>25</b>	<b>100</b>	<b>03 Hrs.</b>
<b>Purpose</b>	<b>To familiar the concepts of cloud services and storage to deploy various resources and arbitrary software.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Facilitate the basic usage and applicability of computing paradigm.						
<b>CO2</b>	Explore various cloud service and deployment models to utilize different cloud services.						
<b>CO3</b>	To get enabled for various data, scalability & cloud services in order to get efficient database for cloud storage.						
<b>CO4</b>	To deal with various security threats and their controlling mechanism for accessing safe cloud services.						

#### **Unit-1**

Overview of Computing Paradigm: Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, evolution of cloud computing, Business driver for adopting cloud computing.

Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages, Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards.

#### **Unit-2**

Cloud Computing Architecture: Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models (XaaS) - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud.

#### **Unit-3**

Service Management in Cloud Computing: Service Level Agreements (SLAs), Billing & Accounting, comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data- Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing.

Case study: Eucalyptus, Microsoft Azure, Amazon EC2.

#### **Unit-4**

Cloud Security: Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

#### **Text Books**

1. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2010.
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.

#### **Reference Books**

1. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012.
2. Ronald L. Krutz, Russell Dean Vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley-India, 2010.



CSE-422	Natural Language Processing						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
4	0	0					3 Hrs.
<b>Purpose</b>	To provide the understanding of the mathematical and linguistic foundations underlying approaches to the various areas in NLP.						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Be familiar with syntax and semantics in NLP.						
<b>CO2</b>	To implement various concepts of knowledge representation using Prolog.						
<b>CO3</b>	To classify different parsing techniques and understand semantic networks.						
<b>CO4</b>	To identify/explain various applications of NLP.						

### Unit-1

**Fundamental components of Natural Language Processing:** Lexicography, syntax, semantics, prosody, phonology, pragmatic analysis, world knowledge.

**Knowledge Representation schemes:** Semantic net, Frames, Conceptual Dependency, Scripts.

### Unit-2

**Representing knowledge using rules:** Logic Programming, Introduction to LISP and Prolog, Rules based deduction systems, General concepts in knowledge acquisition.

**Syntax Analysis:** Formal Languages and grammars, Chomsky Hierarchy, Left- Associative Grammars, ambiguous grammars, resolution of ambiguities.

### Unit-3

**Computation Linguistics:** Recognition and parsing of natural language structures- ATN and RTN, General Techniques of parsing- CKY, Earley and Tomitas algorithm.

**Semantics:** Knowledge representation, semantics networks logic and inference pragmatics, graph models and optimization.

### Unit-4

**Applications of NLP:** Intelligent work processor, Machine translation, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

#### **Text Books:**

1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2<sup>nd</sup> edition, Pearson Edu., 2013.
2. James Allen, "Natural Language Understanding", Pearson Education, Second Edition, 2003.

#### **Reference Books:**

1. Ivan Bratko, "Prolog: Programming for Artificial Intelligence", 3<sup>rd</sup> Edition, Pearson Education, Fifth Impression 2009.
2. G. Gazder, "Natural Language processing in prolog", Addison Wesley, 1989.

CSE-404	Mobile Apps Development						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
4	0	0	4	75	25	100	3 Hrs.
<b>Purpose</b>	<b>To introduce the concepts of developing the mobile applications.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Be exposed to technology and Mobile apps development aspects.						
<b>CO2</b>	Be competent with the characterization and architecture of mobile applications.						
<b>CO3</b>	Appreciation of nuances such as native hardware play, location awareness, graphics, and multimedia.						
<b>CO4</b>	Perform testing, signing, packaging and distribution of mobile apps.						

### Unit 1: Introduction to Mobility

Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, Setting up the Mobile App Development environment along with an Emulator.

App User Interface Designing – Mobile UI resources (Layout, UI elements, Drawable, Menu).

### Unit II: Building blocks of Mobile Apps

Activity- States and Life Cycle, Interaction amongst Activities.

App functionality beyond user interface - Threads, Async task, Services – States and Life Cycle, Notifications, Broadcast receivers, Content provider.

### Unit III: Sprucing up Mobile Apps

Graphics and animation – Custom views, Canvas, Animation APIs, Multimedia – Audio/Video playback and record, Location awareness.

Native data handling –file I/O, Shared preferences, Mobile databases such as SQLite, and Enterprise data access (via Internet/Intranet).

### Unit IV: Testing Mobile Apps

Debugging mobile apps, White box testing, Black box testing, and test automation of Mobile apps, JUnit for Android.

#### Text Books:

1. Barry Burd, *Android Application Development All in one for Dummies*, Wiley publications, 2<sup>nd</sup> Edition 2015.
2. Android Developer Fundamentals Course– Concepts (Learn to develop Android applications) Concepts Reference *Developed by Google Developer Training Team, 2016.*
3. Valentino Lee, Heather Schneider, and Robbie Schell, *Mobile Applications: Architecture, Design, and Development*, Prentice Hall, 2004.
4. Rick Boyer, Kyle Mew, *Android Application Development Cookbook - Second Edition*, 2016.

#### Reference Books:

1. [Carmen Delessio](#), Lauren Darcey, *Teach Yourself Android Application Development In 24 Hours*, SAMS, 2013.
2. Brian Fling, *Mobile Design and Development*, O'Reilly Media, 2009.
3. Maximiliano Firtman, *Programming the Mobile Web*, O'Reilly Media, 2010.
4. Christian Crumlish and Erin Malone, *Designing Social Interfaces*, O'Reilly Media, 2009.
5. Jerome F. DiMarzio, *Beginning Android Programming with Android Studio*, 4th edition, 2016.
6. Max Lemann, *Android Studio: App Development on Android 6*, 2016.

<b>CSE-406</b>	<b>Mobile Apps Development Lab</b>						
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Minor Test</b>	<b>Practical</b>	<b>Total</b>	<b>Time</b>
-	-	2	1	40	60	100	3 Hrs.
<b>Purpose</b>	Design and Implement various mobile applications using emulators and learn how to Deploy applications to hand-held devices.						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Know the components and structure of mobile application development frameworks for Android based mobiles.						
<b>CO2</b>	Understand how to work with various mobile application development frameworks.						
<b>CO3</b>	Learn the basic and important design concepts and issues of development of mobile applications.						
<b>CO4</b>	Understand the capabilities of mobile devices.						

#### **LIST OF PRACTICALS:**

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Implement an application that implements Multi threading
6. Develop a native application that uses GPS location information.
7. Implement an application that writes data to the SD card.
8. Implement an application that creates an alert upon receiving a message.
9. Write a mobile application that creates alarm clock.
10. Develop a sign-in page with appropriate validation.
11. Develop a real life application that makes use of database.

**Note: At least 5 to 10 more exercises are to be given by the teacher concerned.**

<b>CSE-408 Computer Hardware &amp; Troubleshooting Lab</b>							
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Minor Test</b>	<b>Practical</b>	<b>Total</b>	<b>Time</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>40</b>	<b>60</b>	<b>100</b>	<b>3 Hrs.</b>
<b>Purpose</b>	<b>To study the current personal computer hardware including personal computer assembly upgrading, setup configuration and troubleshooting.</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	To understand the fundamental hardware components that makes up a computer's hardware and the role of each of these components.						
<b>CO2</b>	Assemble/setup and upgrade personal computer hardware.						
<b>CO3</b>	Perform installation, configuration, and upgrading of microcomputer hardware and software.						
<b>CO4</b>	Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment.						

#### **List of Practicals:**

1. To make the comparative study of various motherboards.
2. To study various cables used in computer communication.
3. To study various connections and ports used in computer communication.
4. To study various cards used in a computer System like Ethernet, sound, video card etc.
5. To study different microprocessor like P-IV, dual core, i3, i5, i7 etc.
6. To study SMPS and UPS.
7. To study rotational and loading mechanisms of the following drives:(Floppy disk drive, Hard disk, CD ROM,CD-R/RW,DVD-ROM, DVD recordable drives, DUAL LAYER DVD-R/W)
8. To study monitor and its circuitry (CRT (Cathode Ray Tube), LCD (Liquid Crystal Display), LED (Light-Emitting Diodes), Plasma (OLED).
9. To study different types of printers and its installation.
10. To study working of keyboard and mouse.
11. To assemble a PC and trouble shooting.
12. To install different Operating System and install different hardware components.

#### **Text Books:**

1. How Computers WorkBy, Ron White and Timothy Edward Downs, 10<sup>th</sup> Revised edition, Pearson Education, 2014.
2. Upgrading and Repairing PCs, Scott Mueller, 22<sup>nd</sup> Edition, Que Publishing, 2015.
3. Learning PC Hardware, Ramesh Bangia, Khanna Book Publishing, 2<sup>nd</sup> revised edition, 2012.

#### **Reference Book:**

1. Pc Hardware: The Complete Reference 1st Edition, Craig Zacker, McGraw Hill Education; 1<sup>st</sup> edition, 2001.
2. Modern Computer Hardware Course, Manahar Lotia, Pradeep Nair, Payal Lotia, BPB Publications, 2<sup>nd</sup> Revised Edition, 2007.