KURUKSHETRA UNIVERSITY KURUKSHETRA ("A⁺⁺" Grade Accredited by NAAC)

Scheme of Examination and Syllabus for Under-Graduate Programme (Subject: Electronic Equipment & Maintenance) 5th & 6th Semester

Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2024-25

Remarks RemarksCourse CC-64 A, B, & CPaper PaperCrodis Paper Paper Computer Hardware & AHourse Names ATrain MarksFram MarksPramin MarksDuration Duration Duration DurationScheme B & CCC-64 A creditB2.5 EM-50Computer Hardware & Practical332005007003 hirs.Scheme B & CCC-74 A creditB2.5 EM-50Practical121002003003 hirs.Scheme B & CB2.5 A creditFR3.5 EM-50Electronic332005007003 hirs.Scheme B & CB2.5 A credit Scheme B & CB2.5 FFM-500Electronic332005007003 hirs.Scheme B & CB2.5 A credit A creditFR3.5 FFM-500Practical12100200303 hirs.Scheme A CreditTS2.5 A creditFFM-500 PracticalPractical12100200303 hirs.Scheme A & CTS2.5 A creditFFM-500 PracticalPractical12100200303 hirs.Scheme A & R & CTS2.5 A creditFFM-500 PracticalPractical12100200303 hirs.Scheme A & R & creditScheme A & R & creditScheme FFM-500Scheme PracticalCourseScheme PracticalCourseScheme PracticalCourse <td< th=""><th colspan="9">THIRD YEAR: SEMESTER-5</th></td<>	THIRD YEAR: SEMESTER-5									
Scheme A, B & C A, B & C CC-5 4 credit B23. ELM-501 Computer Mardware & Practical 3 3 20 50. 70 3 hrs. Scheme B & C MCC-10 eractical B23- ELM-501 Computer Mardware & Practical 3 3 20 50. 70 3 hrs. Scheme B & C DSE2* 4 credit B & C B33- ELM-501 ELM-504 Practical I 2 100 200 30 3 hrs. Scheme B & C DSE3* 4 credit B & C B33- ELM-504 ELM-504 Practical I 2 100 200 30 3 hrs. Scheme B & C DSE3 / credit B & C Fractical 1 2 100 200 30 318. Scheme A, B & C d credits Fractical 1 2 100 200 30 318. Scheme A, B & C d credits Fractical 1 2 100 200 30 318. Scheme B & C d credits Fractical 1 2 100 200 30 318.	Remarks	Course	Paper(s)Nomenclature of PaperC		Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
A, B & C.4 creditEMM-301Practical121020303 hrs.Scheme B & C.MCC-10 4 creditP23- FFM-503Practical121020303 hrs.Scheme B & C.DSE-3* 4 creditPractical121020303 hrs.Scheme B & C.DSE-3* 4 creditPractical1210020303 hrs.Scheme B & C.DSE-3 FFM-503Practical12100200303 hrs.Scheme B & C.DSE-3 FFM-505Practical121002003003 hrs.Scheme A & C.DSE-3 FFM-505Practical121002003003 hrs.Scheme A & C.C.Practical121002003003 hrs.Scheme A & C.C.Practical121002003003 hrs.Scheme B & C.PracticalPractical121002003003 hrs.Scheme <br< th=""><th>Scheme</th><th>СС-5 МСС-9</th><th>B23-</th><th>Computer Hardware & Maintenance-I</th><th>3</th><th>3</th><th>20</th><th>50</th><th>70</th><th>3 hrs.</th></br<>	Scheme	СС-5 МСС-9	B23-	Computer Hardware & Maintenance-I	3	3	20	50	70	3 hrs.
Scheme B & C MC - 10 4 credit H23- EEM-502 Microprocessor literfacing Practical 3 3 20 50 70 3 hrs. Scheme B & C DSE - 2 4 credit EEM-502 Practical 1 2 10 20 30 3 hrs. Scheme B & C DSE - 2 4 credit EEM-502 Practical 1 2 10 20 30 3 hrs. Scheme B & C DSE -3 4 credit EEM-504 Practical 1 2 10 20 30 3 hrs. Scheme B & C DSE -3 4 credit FEM-505 Introduction to applications 3 3 20 50 70 3 hrs. Scheme A & C 4 credit FPA-505 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C MC - 15V/ 4 credits EEM-506 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C Course Paper(5) Nomenclature of Practical Credit Hours/ Hourdare & 3	Α, Βα C	4 credit	EEMI-301	Practical	1	2	10	20	30	3 hrs.
B & C V (1) Like V (2) Practical (2) 1 2 10 20 50 3 hrs. Selent B & C DSE-2t (4) PE3- (2) PE3- (2) PE3- (2) PE3- (2) PE3- (2) 10 20 30 3 hrs. Selent one D SE-3 (2) DSE-3 (2) B23- (2) Electronic Instrumentation- 2 3 3 20 50 70 3 hrs. Selent B & C DSE-3 (4) B23- (2) B23- (2) Introduction to applications at its applications at its applications 3 3 20 50 70 3 hrs. Scheme A & C DSE-3 (4) B23- (4) Embedied Systems 3 3 20 50 70 3 hrs. Scheme A & B & C Course 4 credit Paper(9) Practical 1 2 10 20 30 3 hrs. Scheme B & C Course 4 credit Paper(9) Nomenclature of Paper(2) Credits Hours' Havar & Marks Marks Marks Marks Marks Marks Marks Marks	Scheme B & C	MCC-10	B23-	Microprocessor Interfacing & its applications	3	3	20	50	70	3 hrs.
	Dac	4 ci cuit	EEN1-302	Practical	1	2	10	20	30	3 hrs.
		DSE-2*	B23-	Electronic Communication-2	3	3	20	50	70	3 hrs.
B & C Select one Option FB2.3, EEM-50 Electrone Instrumentation 2 3 3 20 50 70 3 hrs. Scheme B & C DSE-3 4 credits EEM-50 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C DSE-3 4 credits EEM-50 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C C-M5 (V) 4 credits EEM-50 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C C-M5 (V) 4 credits EEM-500 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C Corrist Ferm Available CC-M5(V) of 4 credits as per NEP Stream Marks Marks Marks Marks Marks Marks Data Stream A, B & C Course A, B & C Paper(S) Nomenclature of Maintenance-II Gredit Marks Marks Marks Marks Marks Data Stream Marks Marks <	Scheme	4 credit	EEN-303	Practical	1	2	10	20	30	3 hrs.
Scheme B & C DSE-3 4 credit Portion Practical Introduction to applications 1 2 10 20 30 3 hrs. Scheme B & C DSE-3 4 credit Portion FB3- EEM-50 FB3- Practical I 2 10 20 30 3 hrs. Scheme A, B & C CC-M5 (V) 4 credits EEM-50 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C CC-M5 (V) 4 credits EEM-50 Practical 1 2 10 20 30 3 hrs. Scheme A, B & C CC-M5 (V) 4 credits From Available CC-M5(V) of 4 credits as per NEP 30 3 hrs. Scheme A, B & C MCC-11 4 credit B23- FEM-601 Nomeclature of Practical Credits Internal Marks Marks Marks Marks Duration Scheme B & C MCC-12 4 credit B23- FEM-602 Mobile Communication 3 3 20 50 70 3 hrs. Scheme B & C MSE-4 4 credit Select one Option B23- FEM-602 Mobile Practical 3 3 <td< th=""><th>B & C</th><th>Select one Option</th><td>B23- FEM-504</td><td>Electronic Instrumentation- 2</td><td>3</td><td>3</td><td>20</td><td>50</td><td>70</td><td>3 hrs.</td></td<>	B & C	Select one Option	B23- FEM-504	Electronic Instrumentation- 2	3	3	20	50	70	3 hrs.
Scheme B & C DSE-3 4 credit Scleet on portion B23- EEM-505 Introduction to applications 3 3 20 50 70 3 hrs. Scheme A & C Cortis Option B23- EEM-506 Finbedded Systems 3 3 20 50 70 3 hrs. Scheme A, & C Cortis 4 credits Finbedded Systems 3 3 20 50 70 3 hrs. Scheme A, & C Internship 4 credits Internship 4 credit Finbedded Systems 3 3 20 50 70 3 hrs. Scheme A, B & C Internship 4 credit Internship 4 credit Finbedded Systems Scheme MCC-11 Internship 4 credit Scheme MCC-11 Paper(s) Nomenclature of Paper Credits Hours/ Wetk Internal marks Marks Marks Marks Marks Duration Scheme B & C MCC-11 4 credit B23- EEM-601 Computer Hardware & Mathenance/II 3 3 20 50 70 3 hrs. Scheme B & C MSE-4 4 credit Select one Option B23- EEM-601 Computer Har			LLW JOH	Practical	1	2	10	20	30	3 hrs.
	Scheme	DSE-3 4 credit	B23- EEM-505	Introduction to Mechatronics and its applications	3	3	20	50	70	3 hrs.
	B & C	Select one		Practical	1	2	10	20	30	3 hrs.
Scheme A & CCC-MS (V) 4 creditsEEM-506Practical121020303 hrs.Scheme A, B & C4 creditsFrom Available CC-M5(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEPScheme A, B & CInternship 4 creditsTHERNSHIP#4 credit after 4th SemesterTHERNSHIP#4 credit after 4th SemesterScheme A, B & CCoursePaper(S)Nomenclature of Paper(S)CreditsHours/ WeekInternal marksExternal MarksTotal MarksExam MarksScheme B & CCC-6 4 creditB23- EEM-601Computer Hardware & Maintenace-II332050703 hrs.Scheme B & CMCC-12 4 creditB23- EEM-601Computer Hardware & Maintenace-II332050703 hrs.Scheme B & CMCC-12 4 creditB23- EEM-602Computer Hardware & Maritical Intelligence & Mobile332050703 hrs.Scheme B & CMSE-4 4 creditB23- EEM-604Communication332050703 hrs.Scheme A onlyDSE-5 4 creditB23- EEM-604EA3- Practical121020303 hrs.Scheme A onlyCC-50(V) 4 creditsB23- EEM-606EA4- Practical121020303 hrs.Scheme A onlyCC-50(V) 4 creditsB23- EEM-606Advanced Embedded Practical		Option	B23-	Embedded Systems	3	3	20	50	70	3 hrs.
From Available CC-M5(V) of 4 credits as per NEPScheme A, B & CInternship 4 creditsInternship 4 creditsInternship#4 credit after 4th semesterTHIRD YEAR: SEMESTER-6RemarksCourse MCC-11 4 creditPaper(s) EEM-601Nomenclature of MarksInternal MarksExternal MarksTotal MarksExample MarksScheme B, B, CCC-6 MCC-11 4 creditB23- EEM-601Computer Hardware & Mathineance-II332050703 hrs.Scheme B, & CMCC-12 4 creditB23- EEM-602Computer Hardware & Mathineance-II332050703 hrs.Scheme B, & CMCC-12 4 creditB23- EEM-602Computer Hardware & Mathineance-II332050703 hrs.Scheme B, & CMSE-4 4 creditB23- EEM-602B23- PracticalInternaling Machine Learning332050703 hrs.Scheme B, & CDSE-5 4 credit Select one OptionB23- EEM-604Advanced Embedded Systems332050703 hrs.Scheme A onlyCC-50(tredit 4 creditsB23- EEM-605Advanced Microprocessors332050703 hrs.Scheme A onlyCC-50(tredit 4 creditsB23- EEM-605Advanced Microprocessors332050703 hrs.Scheme A onlyCC-50(tredit 4 creditsB23-<			EEM-506	Practical	1	2	10	20	30	3 hrs.
Scheme A, B & CInternship 4 creditsInternship#4 credit after 4th semesterTHIRD YEAR: SEMESTER-6RemarksCoursePaper(s)Nomenclature of PaperCreditsHoury/ WeekInternal marksExternal MarksTotal MarksExam DurationScheme B & CCC-61 MCC-11 4 creditB23- EEM-601Computer Hardware & Maintenance-II332050703 hrs.Scheme B & CMCC-12 4 creditB23- EEM-602B23- CommunicationMobile 7332050703 hrs.Scheme B & CDSE-4 4 creditB23- EEM-602B23- PracticalMobile 7332050703 hrs.Scheme B & CDSE-4 4 creditB23- EEM-602B23- PracticalParatical1210020303 hrs.Scheme B & CDSE-4 4 creditB23- EEM-603B23- PracticalB1 21020303 hrs.B & CDSE-5 4 credit Select on OptionB23- EEM-604B23- PracticalB23- Practical1210020303 hrs.Scheme A onlyDSE-5 4 credit 4 creditsB23- EEM-606B23- PracticalB23- Practical1210020303 hrs.B & CDSE-5 4 creditsB23- EEM-606B23- PracticalB23- PracticalB23- Practical33205	Scheme A & C	CC-M5 (V) 4 credits		From Avai	lable CC-M	15(V) of 4 cr	edits as per l	NEP		
THIRD YEAR: SEMESTER-6RemarksCoursePaper(s)Nomenclature of PaperCreditsHours/ WeekInternal marksExternal MarksTotal MarksExam DurationScheme A, B & CCC-6 MCC-11 4 creditB23- EEM-601Computer Hardware & Practical332050703 hrs.Scheme B & CMCC-12 4 creditB23- EEM-602B23- EEM-602Mobile Practical121020303 hrs.Scheme B & CDSE-4 4 creditB23- EEM-603B23- EEM-603Artificial Intelligence & Machine Learning332050703 hrs.Scheme B & CDSE-5 4 creditB23- EEM-604IOT basics and applications332050703 hrs.Scheme B & CDSE-5 4 credit Select one OptionB23- EEM-604IOT basics and applications332050703 hrs.B & CDSE-5 4 credit Select one OptionB23- EEM-604IOT basics and applications332050703 hrs.B & CCC-M6 4 creditsB23- EEM-606Fractical121020303 hrs.B & CCC-M6 4 creditsB23- EEM-606From Available CC-M6 of 4 credits as per NEP332050703 hrs.Scheme A only 4 creditsCC-M6(V) 4 creditsCC-M6(V) of 4 credits as per NEP	Scheme A, B & C	Internship 4 credits		Inte	ernship#4 cr	edit after 4 th	semester			
RemarksCoursePaper(s)Nomenclature of PaperCreditsHours/ WeekInternal marksExternal MarksTotal MarksExam DurationScheme 				THIRD YEAR:	SEMESTI	ER-6				
Scheme A, B & C CC-6 MCC-11 4 credit B23- EEM-601 BCM Computer Hardware & Maintenance-II 3 3 20 50 70 3 hrs. Scheme B & C MCC-12 4 credit B23- EEM-602 B23- EEM-602 Mobile Practical 1 2 10 20 30 3 hrs. Scheme B & C DSE-4 4 credit B23- EEM-602 B23- EEM-602 Mobile Practical 1 2 10 20 30 3 hrs. Scheme B & C DSE-4 4 credit B23- EEM-604 B23- EEM-604 Artificial Intelligence & Machine Learning 3 3 20 50 70 3 hrs. Scheme B & C DSE-5 4 credit Select one Option B23- EEM-604 IOT basics and applications 3 3 20 50 70 3 hrs. B & C DSE-5 4 credit Select one Option B23- EEM-606 Advanced Embedded Systems 3 3 20 50 70 3 hrs. B & C DSE-5 4 credits Select one Option B23- EEM-606 Advanced Microprocessors 3 3 20 50	Remarks	Course	Paper(s)	Nomenclature of Paner	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
A credit EEM-601 Practical 1 2 10 20 30 3 hrs. Scheme B & C MCC-12 4 credit B23- EEM-602 B23- Communication Mobile 3 3 20 50 70 3 hrs. Scheme B & C DSE-4 4 credit Select one Option B23- EEM-602 B23- EEM-604 Artificial Intelligence & Machine Learning 3 3 20 50 70 3 hrs. Scheme B & C DSE-4 4 credit Select one Option B23- EEM-604 B23- EEM-604 IOT basics and applications 3 3 20 50 70 3 hrs. Scheme B & C DSE-5 4 credit Select one Option B23- EEM-604 B23- EEM-604 Advanced Embedded Systems 3 3 20 50 70 3 hrs. Scheme A only CC-M6 4 credits B23- EEM-606 Advanced Microprocessors 3 3 20 50 70 3 hrs. Scheme A only CC-M6 4 credits B23- EEM-606 From Available CC-M6(V) of 4 credits as per NEP From Available CC-M7(V) of 4 credits as per NEP Schemits CC-M6(V)	Scheme A, B & C	CC-6 MCC-11	B23-	Computer Hardware & Maintenance-II	3	3	20	50	70	3 hrs.
Scheme B & C MCC-12 4 credit B23- EEM-602 Mobile Communication 3 3 20 50 70 3 hrs. Scheme B & C DSE-4 4 credit Select one Option B23- EEM-603 B23- EEM-604 Artificial Intelligence & Machine Learning 3 3 20 50 70 3 hrs. Scheme B & C DSE-4 verdit Select one Option B23- EEM-604 Artificial Intelligence & Machine Learning 3 3 20 50 70 3 hrs. Scheme B & C DSE-5 4 credit Select one Option B23- EEM-605 IOT basics and applications 3 3 20 50 70 3 hrs. B & C DSE-5 4 credit Select one Option B23- EEM-605 Advanced Embedded Systems 3 3 20 50 70 3 hrs. B & C DSE-5 4 credits B23- EEM-606 Advanced Embedded Systems 3 3 20 50 70 3 hrs. Scheme A only CC-M6 4 credits Advanced Microprocessors 3 3 20 50 70 3 hrs. S		4 credit	EEM-601	Practical	1	2	10	20	30	3 hrs.
Scheme B & C DSE-4 4 credit Select one Option B23- EEM-603 B23- EEM-604 Artificial Intelligence & Machine Learning 3 3 20 50 70 3 hrs. Scheme B & C DSE-4 4 credit Select one Option B23- EEM-604 Practical 1 2 10 20 30 3 hrs. Scheme B & C DSE-5 4 credit Select one Option B23- EEM-605 IOT basics and applications 3 3 20 50 70 3 hrs. Scheme A dvanced Embedded Systems 3 3 20 50 70 3 hrs. Scheme A only DSE-5 4 credits B23- EEM-605 Advanced Embedded Systems 3 3 20 50 70 3 hrs. B & C DSE-5 4 credits B23- EEM-606 Advanced Microprocessors 3 3 20 50 70 3 hrs. Scheme A only CC-M6(V) 4 credits EEM-606 Practical 1 2 10 20 30 3 hrs. Scheme Commo CC-M6(V) 4 credits From Available CC-M7(V) of 4 credits as per	Scheme B & C	MCC-12 4 credit	CC-12 B23- credit EEM-602	Mobile Communication	3	3	20	50	70	3 hrs.
Scheme B & CDSE-4 4 credits Select one OptionB23- EM-603Artificial Intelligence & Machine Learning332050703 hrs.B & CSelect one OptionB23- EM-604B23- EEM-604IOT basics and applications332050703 hrs.Scheme A onlyDSE-5 4 creditsB23- EEM-606B23- EEM-606Advanced Embedded Systems332050703 hrs.Scheme A onlyDSE-6 4 creditsB23- EEM-606Advanced Cmbedded Practical121020303 hrs.Scheme A onlyCC-M6 4 creditsB23- EEM-606Advanced Microprocessors332050703 hrs.Scheme B onlyCC-M6(V) 4 creditsCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEP33320303 hrs.Scheme C onlyCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEPScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEP				Practical	1	2	10	20	30	3 hrs.
Scheme B & C 4 credit Select one Option EEM-603 Practical 1 2 10 20 30 3 hrs. B & C Select one Option IOT basics and applications 3 3 20 50 70 3 hrs. Scheme B & C DSE-5 4 credit Select one Option B23- EEM-604 Advanced Embedded Systems 3 3 20 50 70 3 hrs. Scheme Option DSE-5 4 credit Select one Option B23- EEM-606 Advanced Embedded Systems 3 3 20 50 70 3 hrs. B & C DSE-5 4 credit Select one Option B23- EEM-606 Advanced Microprocessors 3 3 20 50 70 3 hrs. B & A only 4 credits Advanced Microprocessors 3 3 20 50 70 3 hrs. Scheme B only CC-M6(V) 4 credits From Available CC-M6 of 4 credits as per NEP IOT basics and applications		DSE-4	B23-	Artificial Intelligence & Machine Learning	3	3	20	50	70	3 hrs.
Bac CSelect one OptionB23- EEM-604IOT basics and applications332050703 hrs.Scheme B & CDSE-5 4 credit Select one OptionB23- EEM-605Advanced Embedded Systems332050703 hrs.Scheme A onlyDSE-5 4 creditsB23- EEM-606Advanced Embedded Systems332050703 hrs.Scheme A onlyCC-M6 4 creditsB23- EEM-606Advanced Microprocessors332050703 hrs.Scheme A onlyCC-M6 4 creditsCC-M6 4 creditsPractical121020303 hrs.Scheme B onlyCC-M5(V) 4 creditsFrom Available CC-M7(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEPVScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M6(V) of 4 credits as per NEPFrom Available CC-M6(V) of 4 credits as per NEP	Scheme B & C	4 credit	EEM-003	Practical	1	2	10	20	30	3 hrs.
Scheme B & CDSE-5 4 credit Select one OptionB23- EM-605Advanced Embedded Systems332050703 hrs.Scheme A onlyCC-M6 4 creditsB23- EEM-606Advanced Microprocessors332050703 hrs.Scheme A onlyCC-M6 4 creditsAdvanced Microprocessors332050703 hrs.Scheme B onlyCC-M7(V) 4 creditsFrom Available CC-M6 of 4 credits as per NEP33320303 hrs.Scheme B onlyCC-M5(V) 4 creditsFrom Available CC-M7(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEPVVScheme B onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPVVVScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPVV	bac	C Select one Option	B23-	IOT basics and applications	3	3	20	50	70	3 hrs.
Scheme B & CDSE-5 4 credit Select one OptionB23- EEM-605Advanced Embedded Systems332050703 hrs.B23- EEM-606Practical121020303 hrs.B23- EEM-606B23- EEM-606Advanced Microprocessors332050703 hrs.Scheme A onlyCC-M6 4 creditsAdvanced Microprocessors332050703 hrs.Scheme A onlyCC-M6 4 creditsFrom Available CC-M6 of 4 credits as per NEP303 hrs.Scheme B onlyCC-M5(V) 4 creditsFrom Available CC-M7(V) of 4 credits as per NEPVScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEP			EEM-604	Practical	1	2	10	20	30	3 hrs.
Scheme B & C4 credit Select one OptionEEM-605Practical121020303 hrs.B23- EEM-606Advanced Microprocessors332050703 hrs.Scheme A onlyCC-M6 4 creditsFrom Available CC-M6 of 4 credits as per NEP303 hrs.Scheme B onlyCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEP	Scheme	DSE-5	B23-	Advanced Embedded Systems	3	3	20	50	70	3 hrs.
Select one OptionB23- EEM-606Advanced Microprocessors332050703 hrs.Scheme A onlyCC-M6 4 creditsPractical121020303 hrs.Scheme A onlyCC-M7(V) 4 creditsFrom Available CC-M6 of 4 credits as per NEPImage: Scheme From Available CC-M7(V) of 4 credits as per NEPScheme B onlyCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPImage: Scheme From Available CC-M5(V) of 4 credits as per NEPScheme B onlyCC-M6(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPImage: Scheme From Available CC-M5(V) of 4 credits as per NEPScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M6(V) of 4 credits as per NEP	B & C	4 credit	EEM-605	Practical	1	2	10	20	30	3 hrs.
Scheme A onlyCC-M6 4 creditsPractical121020303 hrs.Scheme A onlyCC-M6 4 creditsFrom Available CC-M6 of 4 credits as per NEPFrom Available CC-M7(V) of 4 credits as per NEPScheme B onlyCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEPScheme B only4 creditsFrom Available CC-M5(V) of 4 credits as per NEPFrom Available CC-M5(V) of 4 credits as per NEPScheme C only4 creditsFrom Available CC-M6(V) of 4 credits as per NEPFrom Available CC-M6(V) of 4 credits as per NEP		Ontion	B23-	Advanced Microprocessors	3	3	20	50	70	3 hrs.
Scheme A onlyCC-M6 4 creditsFrom Available CC-M6 of 4 credits as per NEPScheme A onlyCC-M7(V) 4 creditsFrom Available CC-M7(V) of 4 credits as per NEPScheme B onlyCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M6(V) of 4 credits as per NEP		Option	EEM-606	Practical	1	2	10	20	30	3 hrs.
Scheme A onlyCC-M7(V) 4 creditsFrom Available CC-M7(V) of 4 credits as per NEPScheme B onlyCC-M5(V) 4 creditsFrom Available CC-M5(V) of 4 credits as per NEPScheme C onlyCC-M6(V) 4 creditsFrom Available CC-M6(V) of 4 credits as per NEP	Scheme A only	CC-M6 4 credits		From Av.	ailable CC-	M6 of 4 cree	lits as per NI	EP		
Scheme CC-M5(V) From Available CC-M5(V) of 4 credits as per NEP B only 4 credits Scheme CC-M6(V) C only 4 credits	Scheme A only	CC-M7(V) 4 credits		From Avai	lable CC-M	17(V) of 4 cr	edits as per 1	NEP		
Scheme C only CC-M6(V) 4 credits From Available CC-M6(V) of 4 credits as per NEP	Scheme B only	CC-M5(V) 4 credits		From Avail	able CC-M	(5(V) of 4 ci	edits as per	NEP		
	Scheme C only	CC-M6(V)		From Avail	able CC-M	[6(V) of 4 cı	edits as per	NEP		
Scheme SEC-4 C only 2 credit From Available SEC-4 of two credits as per NEP	Scheme C only	SEC-4		From Ava	ilable SEC-	-4 of two cre	dits as per N	EP		

Session: 2024-25						
]	Part A - Introd	uction		
Subj	ect		ELECTRONIC	EQUIPMENT & MAI	NTENANCE	
Seme	ester		FIFTH			
Nam	e of the Course		Computer Hard	ware & Maintenance-I		
Cou	rse Code		B23-EEM-501			
Cour DSE	se Type: (CC/MCC/MDC C/VOC/DSE/PC/AEC/VA	C/CC-M/ AC)	CC-5 MCC-9			
Leve	el of the course		300-399			
Pre-r	requisite for the course	(if any)	Knowledge of	Electronics		
Course (CLO)	 Course Learning Outcomes (CLO): After completing this course, the learner will be able to: Understand the basic concepts of the working of a PC system and functions of its main parts. Familiarize with the importance of BIOS, Bus System, and primary and secondary memories in a PC. Learn the functions and mechanism of different types of computer peripheral devices. Understand the software in a PC System. Learning the above through practicals 					and functions of its and primary and omputer peripheral
		The	eory	Practical		Total
Cre	dits		3	1		4
Cor	tact Hours per week		3	2	2 5	
Max Inte End	x. Marks: 100(70 Theo rnal Assessment Marks: 2 Term Exam Marks: 50 T	ory + 30 Practica 0 Theory + 10 P heory + 20 Pract	l) Practical tical	Exam Time: 3 Hours	s each for The	eory & Practical
		Part	B- Contents of	the Course		
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit. A student is required to attempt 5 questions in all.						
Unit			Topics			Contact Hours
Ι	I Personal Computer: Evolution PC through Pentium; specifications of different styles of PCs, Functional Block diagram, System Unit and its various parts, Introduction to peripheral parts, Input/output ports (serial port, parallel port, USB port).Motherboard, Motherboard Layouts with specifications, Motherboard items, SMPS and linear power supply (Brief Idea and comparison).					12
Π	Basic Input/ Output Sy Standards: BUS Archited On Board Memory & Memory Packages, Ma capacity, HDD, FDD & organization in DOS.	ystem (BIOS): cture with basic Magnetic Magnetic Magnetic Storage &HDD sub-asse	services,features specifications (X edia: PC Memo (Fundamentals, emblies, HDD c	and functional parts of T, ISA, EISA, MCA, V ry Organization, Type Diskette basics, FDD ontroller & interface	BIOS, Bus (L, PCI) s of RAM, Types and types) Disk	11

III	 III Input Devices: Keyboard (basics, operation, types, functions, signals, interface logic); Mouse (principle of operation, types, signals); Scanner (principle of operation, types). Output Devices: VDU (Video basics, types of display adaptors, Basic mechanism of CRT Controller); Printer (printing mechanism, types: DMP, Inkjet, Laser Printer, MFP, Data transfer b/w PC & Printer). 					
IV	CD-ROM Drive : Principle of operation, merits and demerits, CD/DVD Diskette construction and R/W mechanism, Comparison of CD and DVD, Caring for CD and DVD discs, front and rearview details of CD/DVD drives. Software Concepts: System software, application software, operating systems, MSDOS and Windows	10				
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Installation of Windows operating system and other software. 2. Installation of peripheral devices in a PC system. 3. Maintenance and cleaning of diskette drives, keyboard, mouse. 4. To identify various cards, assembly and disassembly of a PC system. 5. Study the mechanism of CD-ROM/DVD Drive by noting voltages at various check points and its installation. 6. Installation of peripheral devices (Scanner, Printers) in a PC system. 7. To study setting up of network on PC and sharing of printer. 	30				
	Suggested Evaluation Methods					
Inte >	End Term Examination: 50 marks 20 marks					
Part C-Learning Resources						
Recommended Books/e-resources/LMS:						
 IBM PC Clones by Govindarajalu PC Hardware: The Complete Reference by C. Zacker, J. Rourke 						

Session: 2024-25						
]	Part A - Introd	uction		
Subject	t		ELECTRONIC	EQUIPMENT & MAI	NTENANCE	2
Semeste	er		FIFTH			
Name o	of the Course		Microprocessor	Interfacing & its applic	cations	
Course	Code		B23-EEM-502			
Course DSEC/V	Type: (CC/MCC/MDC/ VOC/DSE/PC/AEC/VA	/CC-M/ C)	MCC-10			
Level of	f the course		300-399			
Pre-requ	uisite for the course	(if any)	Basic Knowledg	ge of Electronics		
 Course Learning Outcomes (CLO): After completing this course, the learner will be able to: Understand the fundamental concepts of interfacing of 8085 microprocessor. Learning the programming of 8085 microprocessor. Interfacing of 8085 microprocessor with Direct Memory Access Com 8257. Learn the fundamental concepts of interfacing and to design basic applic being interfaced with 8085 microprocessor. Learning the above concepts through practicals 					3085 microprocessor y Access Controller gn basic applications	
Credits	5	The	eory	Practical		Total
			3	1	4	
Contac	et Hours per week		3	2	5	
Max. N Interna End Te	Marks: 100(70 Theor al Assessment Marks: 20 erm Exam Marks: 50 Th	ry + 30 Practical) Theory + 10 Pr leory + 20 Pract	l) Exam Time: 3 Hours each for Theory & Practical ical			
		Part	B- Contents of	the Course		
 Instructions for Paper- Setter Nine questions will be set in all. All questions will carry equal marks. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 						
Unit			Topics			Contact Hours
Ι	Programmable Interval Timer 8253: Block diagram of 8253, control word format for 8253, Interfacing & programming of 8253, Programming of 8253 in various modes.				12	
II	II Direct Memory Access Controller 8257: Block diagram, Programming of 8257, Programmable Interrupt Controller Intel 8259, Internal Registers of 8259 Programmable communication Interface (Intel 8251)				12	
III	To generate Square Control of Firing Cir Selector, Interfacing o	Wave or pulse cuit of a Thyri f Digital De-mu	e using Micropr stor , Interfacin ltiplexer/ Decode	ocessor, Microprocess g of Digital Multiplex r	or-Based er/ Data	11

IV	Applications to illustrate the use of Microprocessor in:	10					
	1. Traffic light						
	2. Temperature control						
	3 Stepper Motor control						
	4 Washing machine control						
V*	Note: A candidate is required to perform minimum 5 experiments out of the list provided	30					
	during course of study in this semester.						
	1. Generate a time delay through software on Microprocessor-Kit.						
	2. Program to generate Square wave or pulse using SOD Line.						
	3. Program to generate Sine wave using Microprocessor-Kit.						
	4. Program to generate Square waves using Microprocessor-Kit.						
	5. Program to generate thangular wave using Microprocessor-Kit.						
	o. Study the IC Tester application on 80%5 Missegregation Life						
	8 Study the Stepper Motor control application using Microprocessor-Kit						
	9 Study the interface connections of 7-segment display						
	7. Study the interface connections of 7 segment display.						
Suggested Evaluation Methods							
	Suggested Evaluation Methods						
Intern	Suggested Evaluation Methods al Assessment:	End Term					
Intern ≻ T	Suggested Evaluation Methods al Assessment: heory (20 Marks)	End Term Examination:					
Intern ≻ T	Suggested Evaluation Methods al Assessment: heory (20 Marks) Class Participation (5Marks)	End Term Examination: 50 marks					
Intern > T	Suggested Evaluation Methods al Assessment: heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks)	End Term Examination: 50 marks					
Intern > T	Suggested Evaluation Methods al Assessment: heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks)	End Term Examination: 50 marks					
Intern > T • • • •	Suggested Evaluation Methods suggested Evaluation Methods heory (20 Marks) heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks)	End Term Examination: 50 marks					
Intern	Suggested Evaluation Methods suggested Evaluation Methods al Assessment: heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) Class Participation:	End Term Examination: 50 marks 20 marks					
Intern ≻ T • • • • • • • • • •	Suggested Evaluation Methods suggested Evaluation Methods heory (20 Marks) heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks)	End Term Examination: 50 marks 20 marks					
Intern > T • • • • • • • • • • • • •	Suggested Evaluation Methods ral Assessment: heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks) Mid-Term Exam:	End Term Examination: 50 marks 20 marks					
Intern ≻ T • • • • • • • • • •	Suggested Evaluation Methods val Assessment: heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks) Mid-Term Exam:	End Term Examination: 50 marks 20 marks					
Intern > T • • • • • • • • • • • • •	Suggested Evaluation Methods suggested Evaluation Methods Part C-Learning Resources	End Term Examination: 50 marks 20 marks					
Intern > T • • • • • • • • • • • • •	Suggested Evaluation Methods suggested Evaluation Methods heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks) Mid-Term Exam: Part C-Learning Resources mended Books/e-resources/LMS: partocessor Architecture, programming and application with the \$085 by R \$ Geonker	End Term Examination: 50 marks 20 marks					
Intern ➤ T • • • • • • • • • • • • •	Suggested Evaluation Methods suggested Evaluation Methods heory (20 Marks) Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks) Mid-Term Exam: Part C-Learning Resources mended Books/e-resources/LMS: oprocessor Architecture, programming and application with the 8085 by R S Gaonkar amentals of Microprocessors and Microcontrollers by B RAM	End Term Examination: 50 marks 20 marks					

Session: 2024-25						
		Par	t A - Introduct	ion		
Subject	;		ELECTRONIC	EQUIPMENT & MAI	NTEN	ANCE
Semeste	er		FIFTH			
Name c	of the Course		Electronic Con	nmunication-2		
Course	Code		B23-EEM-503			
Course DSEC/V	Type: (CC/MCC/MDC/ VOC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-2			
Level o	f the course		300-399			
Pre-requ	uisite for the course	(if any)	Basic Knowledg	ge of Electronics		
Course Learning Outcomes (CLO): After completing this course, the learner will be able to: 1. Understand the use of antenna and its parameters. 2. Understand the wireless communication systems. 3. Understand the wireless networks. 4. Understand the cellular system. 5. Learning the above through practicals						
		The	eory	Practical		Total
Credits	3		3	1	4	
Contac	et Hours per week		3	2	5	
Max. Marks: 100(70 Theory + 30 Practical Internal Assessment Marks: 20 Theory + 10 Pr End Term Exam Marks: 50 Theory + 20 Pract			I)Exam Time: 3 Hours each for Theory &racticalPractical			
		Part B-	· Contents of the	e Course		
 Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each unit. 						
			Topics			Contact Hours
Ι	Antenna & its Parameters: : Antenna as an element of wireless communication11system, Types of Antennas, Antenna parameters: Radiation pattern (polarization11patterns, Field and Phase patterns), Field regions around antenna, Radiation11intensity, Beam width, Gain, Directivity, Polarization, Bandwidth, Efficiency and Antenna temperature.11				11	
II Wireless Communication Systems: History of wireless communication, Wireless 12 Generation and Standards, Cellular and Wireless Systems, Current Wireless 12 Systems, Cellular Telephone Systems, Wide Area Wireless Data Services, Broadband Wireless Access, Satellite Networks, Examples of Wireless Communication Systems. 12				12		
III	Wireless Networks: 5 (3G) Wireless Networks (WLANs), Wi-Fi, 4G and LTE, 5	Second Generati orks, Wireless Bluetooth and I G	on (2G) Cellular Local Loop (W Personal Area N	Networks, Third Gener /LL), Wireless Local etworks (PANs). Idea	ration Area about	12

IV	Cellular System : Cellular Concept and Cellular System Fundamentals, Frequency Reuse, Channel Assignment Strategies, Handoff strategies, Interference and System Capacity, Trunking and Grade of Service. Improving Coverage& Capacity in Cellular Systems, Cell Splitting and Sectoring, Cellular Systems design Considerations (Qualitative idea only).	10				
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Measurement of radiation pattern of all wired and aperture antennas using AMS Kit 2. Measurement of radiation pattern of planar antennas using AMS kit. 3. Measurement of radiation pattern of reflector antenna using AMS kit. 4. Measurement of signal strength using Wi-Fi analyzer software. 5. Measurement of Antenna parameters using Network analyzer. 6. Demonstrate how obstacles such as building and trees affect the Cellular signals. 7. Design and simulation of micro strip antenna using CST tool. 8. Network Performance Testing :Measurement of Network Bandwidth and latency using tools like iPerf. 	30				
	Suggested Evaluation Methods					
Intern ≻ TI • • • • • • •	al Assessment: heory (20 Marks) Class Participation: (5Marks) Seminar/presentation/assignment/quiz/class test etc.: (5Marks) Mid-Term Exam: (10Marks) racticum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.: (10Marks) Mid-Term Exam:	End Term Examination: 50 marks 20 marks				
Part C-Learning Resources Recommended Books/e-resources/LMS: 1. Ballanis, Antenna Theory, John Wiley & Sons, (2003) 2nd Ed. 2. Jordan and Balmain, E. C., Electro Magnetic Waves and Radiating Systems, PHI, 1968 Reprint (2003) 3rd Ed. 3. Andrea Goldsmith, Wireless communications, (2015) Cambridge University Press 4. D. Tse and P. Viswanathan, Fundamentals of Wireless Communication, (2014) Cambridge University Press. 5. Wireless communication and Networks, Upena Dala, 2015, Oxford University Press. 6. Antenna and Wave Propagation, Yadava, PHI Learning. 7. Haykin S. & Moher M., Modern Wireless Communication, Pearson, (2005) 3rd Ed.						

Session: 2024-25						
Part A - Introduction						
Subject			ELECTRONIC EQUIPMENT & MAINTENANCE			
Semeste	er		FIFTH			
Name o	of the Course		Electronic Instr	umentation-2		
Course	Code		B23-EEM-504			
Course DSEC/V	Type: (CC/MCC/MDC/ VOC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-2			
Level of	f the course		300-399			
Pre-requ	uisite for the course	(if any)	Basic Knowled	ge of Electronics		
Course Learning Outcomes (CLO):After completing this course, the learner will be able to: 1. Understand different chemical and biosensors. 2. Learn about measurement techniques for different physical variables like speed, force, flow etc. 3. Learn how to measure density, viscosity and humidity 4. Understand basic principles of NMR and microscopic techniques. 5. Hand on experience in lab for various measurements.					t physical variables ty ic techniques.	
Credits	3	The	eory	Practical		Total
			3	1		4
Contac	et Hours per week		3	2		5
Max. N Interna End Te	Marks: 100(70 Theo Il Assessment Marks: 20 erm Exam Marks: 50 Th	ry + 30 Practical D Theory + 10 Pr heory + 20 Pract	I)Exam Time: 3 Hours each for Theory &racticalPractical			
		Part B-	Contents of the	Course		
 Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 						
Unit			Topics			Contact Hours
Ι	Chemical sensors: PH sensor, Gas sensor (Fundamental aspects) Biosensors – Types - Calorimetric Biosensors, Potentiometric Biosensors, Amperometric Biosensors, Optical Biosensors, Immunosensors, Smart Sensors - SQUID Sensors					10
II	Measurement of Various parameters: Speed, Force, Acceleration, Measurement of speed- Revolution counter, Drag cup tachometer Measurement of force - Load cell, pneumatic load cell, hydraulic load cell. Measurement of acceleration - Elementary accelerometers, seismic accelerometers Orifice, Venturi meter, Pitot tube, flow nozzle rotameter, Positive displacement meter, turbine flowmeter, electromagnetic flow meter, ultrasonic flow meter					

III	III Measurement of Density, Viscosity, Humidity Hydrometer – continuous weight measurement, liquid densitometer – float principle, air pressure balanced method, using gamma rays – gas density measurements – gas specific gravity measurements – Viscosity terms, say bolt viscometer, rotometer type viscometer, and Industrial consistency meters. Humidity terms – dry & wet bulb psychrometers – hot wire electrode type hygrometer, electrolytic hygrometer, Dew point hygrometer					
IV	Nuclear Magnetic Resonance and Microscopic Techniques NMR: Basic principles, NMR spectrometer and Applications - Electron spin Resonance spectroscopy: Basic principles, Instrumentation and applications, Basic principles, Instrumentation, and applications: Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM). Mass spectrometers: Different types and Applications.	12				
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Measurement of Viscosity using any technique 2. Measurement of humidity using any technique 3. Study of different types of Biosensors (Qualitative) 4. PH meter standardization and measurement of PH value of solutions 5. Measurement of flow using Venturi Meter/ orifice Meter/Rotameter 6. Flow measurement using Electromagnetic flow meter and ultrasonic flow meter. 7. Study of basic principle and detailed instrumentation of Scanning Electron Microscope (SEM) 8. Study of basic principle and detailed instrumentation of Transmission Electron Microscope (TEM) 9. Study of basic principle and detailed instrumentation of Nuclear Magnetic Resonance (NMR) 	30				
	Suggested Evaluation Methods					
Intern ≻ T • •	Internal Assessment: End Term ➤ Theory (20 Marks) Examination: • Class Participation (5Marks) Examination: • Seminar/presentation/assignment/quiz/class test etc. (5 Marks) 50 marks • Mid-Term Exam (10 Marks) 50 marks					
•	20 marks					
Part C-Learning Resources						
Recommended Books/e-resources/LMS: 1. Sawhney A.K., "Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai Publications,2001 2. D. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999						

D. Patranabis, "Principles of Industrial Instrumentation", Tata McGraw Hill, 2ndEdition, New Delhi, Reprint 2009.

Session: 2024-25						
		Part A	A – Introduction	n		
Subj	ject		ELECTRONIC	EQUIPMENT & MAII	NTENANCE	
Seme	ester		FIFTH			
Nam	ne of the Course		Introduction to	Mechatronics and its A	oplications	
Cou	rse Code		B23-EEM-505			
Cour DSE	rse Type: (CC/MCC/MDC/ C/VOC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-3			
Leve	el of the course		300-399			
Pre-r	requisite for the course	(if any)	Basic Knowledg	ge of Electronics		
Course (CLO)	Course Learning Outcomes (CLO):After completing this course, the learner will be able to: 1. Understanding about the basic elements of a mechatronics system 2. Learning the various blocks that form a Mechatronic System 3. Materials for mechatronic applications 4. Processes used for robot formation 5. Learning the above through practicals					
Cre	dits	The	eory	Practical	Total	
			3	1	4	
Con	ntact Hours per week		3	2	5	
Max Inte End	x. Marks: 100(70 Theo ernal Assessment Marks: 20 1 Term Exam Marks: 50 Th	ry + 30 Practica 0 Theory + 10 Pr neory + 20 Pract	l) Exam Time: 3 Hours each for Theory & ractical Practical			
		Part B- C	Contents of the C	Course		
 Instructions for Paper- Setter Nine questions will be set in all. All questions will carry equal marks. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 						
Unit		Т	opics		Contact Hours	
I	Introduction: Definition of Mechanical Systems, Philosophy and approach; Systems and Design: Mechatronic approach, Integrated Product Design, Modelling, Analysis and Simulation, Man-Machine Interface. Sensors and transducers: classification, Development in Transducer technology, Opto- Electronics-Shaft encoders, CD Sensors, Vision System, etc.					
II	I Drives and Actuators: Hydraulic and Pneumatic drives, Electrical Actuators such as servo motor and Stepper motor, Drive circuits, open and closed loop control; Embedded Systems: Hardware Structure, Software Design and Communication, Programmable Logic Devices, Automatic Control and Real Time Control Systems 10					
III	Smart materials: Shape Actuators: Materials, Sta positioning, vibration iso	Memory Allo tic and dynamic lation, etc.	y, Piezoelectric characteristics, i	and Magneto strictive illustrative examples fo	e 12 r	

IV	Micro mechatronic systems: Microsensors, Micro actuators; Micro-fabrication techniques LIGA Process: Lithography, etching, Micro-joining etc. Application examples; Case studies Examples of Mechatronic Systems from Robotics Manufacturing, Machine Diagnostics, Road vehicles and Medical Technology.	12				
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Identification and familiarization of the following components: resistors, inductors, capacitors, diodes, transistors, LED's. 2. Familiarization with the following components: CRO, transformer, function generator, Multimeter, power supply. 3. Familiarization with the following electrical machines: Induction motors, DC motors, synchronous motors, single phase motors. 4. Familiarization with the following mechanical components: gears, gear train, bearings, couplings, tachometer 5. To study and design the PN junction diode and its use as half wave and full wave rectifier. 6. To design a voltage regulator using zener diode. Discuss the behavior of the regulator for various loads. 7. To verify truth tables of various logic gates and flip flops. 8. To study various sensors and transducers and compare with ideal characteristics. 9. To measure the characteristics of LVDT using linear displacement trainer kit. 	30				
	Suggested Evaluation Methods					
Inte >	ernal Assessment: Theory (20 Marks)	End Term Examination:				
A	 Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc.(5 Marks) Mid-Term Exam (10 Marks) Practicum (10 Marks) 					
	 Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks) Mid-Term Exam: 	20 marks				
	Part C-Learning Resources					
 Recommended Books/e-resources/LMS: 1. Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.). 2. Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education 3. A Textbook of Mechatronics, R.K. Rajput, S. Chand & Company Private Limited 4. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, William Bolton, 						
Prentice Hall.						

Session: 2024-25						
		Р	art A - Introdu	iction		
Subject	t		ELECTRONIC	EQUIPMENT & MAI	NTENANC	E
Semeste	er		FIFTH			
Name o	of the Course		Embedded Syst	ems		
Course	Code		B23-EEM-506			
Course DSEC/V	Type: (CC/MCC/MDC/ VOC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-3			
Level of	f the course		300-399			
Pre-requ	uisite for the course	(if any)	Familiarity with write program a windows enviro	h basic concepts of particular particular has a language on the second s	rogramming e of your ch	and the ability to oice (e.g. C++) in a
Course L (CLO):	 After completing this course, the learner will be able to: Student will be able to: Understand the Embedded system, Embedded Systems on a Chip (SoC) recognize the need of Embedded system Understand the Embedded firmware Learn about 8051 Microcontroller Practical Hands on with Arduino/Raspberry Microcontrollers 					
Credits	5	The	eory	Practical		Total
			3	1		4
Contac	et Hours per week		3	2	5	
Max. N Interna End Te	Marks: 100 (70 Theo al Assessment Marks: 20 erm Exam Marks: 50 Th	ry + 30 Practica 0 Theory + 10 Pr neory + 20 Pract	Al)Exam Time: 3 Hours each for Theory & Practicalracticalical			heory & Practical
		Part	B- Contents of	the Course		
 Instructions for Paper- Setter Nine questions will be set in all. All questions will carry equal marks. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit 						
Unit			Topics			Contact Hours
Ι	Introduction to Embedded Systems: Background and History of embedded systems, Definition and Classification, Von-Neuman and Harvard architectures, Processor design tradeoffs, CISC and RISC architectures, Programming languages for embedded systems, Embedded Systems on a Chip (SoC), memory devices for embedded systems				10	
II	systems, Embedded Systems on a Chip (SoC), memory devices for embedded systems II Characteristics and quality attributes of embedded systems : Characteristics, Operational and nonoperational quality attributes, application specific embedded system - washing machine, domain specific – automotive Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time CLO sck, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages. 11					11

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III	The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts. Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.	12					
IV	IVMoving Data: Introduction, Addressing Modes, External Data Moves, Code Memory Read Only Data Moves, Push and Pop Op-codes, Data Exchanges. Basic Design Using a Real-Time Operating System: Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment						
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Assembly Language Programming experiments using 8051 Trainer kit. 2. Data transfer/exchange between specified memory locations. 3. Largest/smallest from a series. 4. Sorting (Ascending/Descending) of data. 5. Addition / subtraction / multiplication / division of 8/16 bit data. 6. Sum of a series of 8 bit data. 7. Multiplication by shift and add method. 8. Square / cube / square root of 8 bit data. 9. Matrix addition. 10. LCM and HCF of two 8 bit numbers. 11. Code conversion – Hex to Decimal/ASCII to Decimal and vice versa. 	30					
	Suggested Evaluation Methods						
Intern >] • • • • • • •	ral Assessment: Theory (20 Marks) Class Participation: (5 Marks) Seminar/presentation/assignment/quiz/class test etc.: (5 Marks) Mid-Term Exam: (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.: (10 Marks) Mid-Term Exam:	End Term Examination: 50 Marks 20 Marks					
Deeper							
1.	 Recommended Books/e-resources/LMS: 1. Raj Kamal, Embedded System Architecture, Programming and Design, Tata McGraw Hill, (2004). 2. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill. 						
3.	3. 8051 Microcontrollers, Satish Shah, Oxford Higher Education.						
4.	Introduction to embedded systems, Shibu K V Tata McGraw-Hill.						
5. 6	Embedded Systems – Lyla, Pearson, 2013. The 8051 Microcontroller and Embedded Systems Using Assembly and C. Mohammad	Ali Mazidi Dearson					
0.	6. The 8051 Microcontroller and Embedded Systems Using Assembly and C, Mohammad Ali Mazidi, Pearson Education India						

Session: 2024-25							
Part A - Introduction							
Subject	t		ELECTRONIC EQUIPMENT & MAINTENANCE				
Semeste	er		SIXTH				
Name c	of the Course		Computer Hard	ware & Maintenance-II			
Course	Code		B23-EEM-601				
Course DSEC/V	Type: (CC/MCC/MD0 VOC/DSE/PC/AEC/V	C/CC-M/ AC)	CC-6 MCC-11				
Level o	f the course		300-399				
Pre-requ	uisite for the course	e (if any)	Basic Knowled	ge of Electronics			
Course L (CLO):	 Course Learning Outcomes (CLO): After completing this course, the learner will be able to: Familiarize with the fundamentals concepts in the installation of a PC System. Familiarize with diagnosis of common symptoms of faulty peripherals of a PC System. Learn the troubleshooting techniques of various peripherals of a PC System. Learn basic steps for the maintenance and upgradation of a PC System. Learning the above through practicals 						
Credits	5	The	ory	Practical	Total		
		3	}	1	4		
Contac	et Hours per week	3	5	2	5		
Max. N Interna End Te	Marks: 100(70 The al Assessment Marks: 2 erm Exam Marks: 50 T	ory + 30 Practical 20 Theory + 10 Pr Theory + 20 Pract	l) ractical ical	Exam Time: 3 Hours each for Theory & Practical			
		Part F	B- Contents of tl	ne Course			
 <u>Instructions for Paper- Setter</u> 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 							
Unit			Topics		Contact Hours		
I	IPC Installation: Room Preparation (Location, PC room pollution, air conditioning with principle of operation of an AC system, false flooring & false ceiling, fire protection system); PC Installation (basic steps).Boot Process (DOS & Windows), basic functions of POST and its test sequences. Power Supply for PC: Clean power supply, p.s. problems, power conditioning, servo stabilizer, CVT, offline and online UPS (basic idea).11						
II	Troubleshooting P procedure and their possible problems, (troubleshooting co symptoms), Printer troubleshooting).	C Faults-I: Mo troubleshooting; diagnosis proce mmon sympton s (possible pro	ther board poss Keyboard (chec dure and their ns), Monitor (blems, diagnos	sible problems, diagno ks for proper functioni troubleshooting), Mo troubleshooting comm is procedure and th	osis 10 ng, use non eir		

III	Troubleshooting PC Faults-II: CD-ROM (Installation upgradation, replacement, trouble shooting common symptoms), FDD (Installation, replacement and troubleshooting common symptoms), HDD (Preparation Concepts, installation, replacement and troubleshooting common symptoms), Memory (upgradation, installation, and troubleshooting common symptoms)	12			
IV	General PC Servicing: PC maintenance using various diagnostic S/W, universal trouble shooting process, computer viruses and their types, virus protection techniques, quick start bench testing, tips for windows startup problems. PC Upgrading: Introduction, Upgrade Essentials, Performance Upgrade, Capacity Upgrades, Features Upgrades	12			
V*	Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester.	30			
	1. To study and testing of offline and online UPS.				
	2. To study troubleshooting of Motherboard issues.				
	3. To study use of PC troubleshooting software.				
	4. To study upgradation of PC hardware.				
	5. To study troubleshooting of keyboard, mouse, Monitor etc.				
	6. To identify various cards, assembly and disassembly of a PC system.				
	7. Familiarization of Diagnostic tools and Antivirus Software for the repair/ maintenance of PC.				
	8. Study of power supply for PC.				
	Suggested Evaluation Methods				
Intern	al Assessment:	End Term			
► T	heory(20 Marks)	Examination:			
•	Class Participation(5Marks) Seminar/presentation/assignment/guiz/class test etc (5 Marks)	50 marks			
•	Mid-Term Exam(10 Marks)				
> P	racticum(10 Marks)				
•	 Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.(10 Marks) Mid-Term Exam: 				
Part C-Learning Resources					
Recon	nmended Books/e-resources/LMS:				
1. IBN 2. PC 3. PC	A PC Clones by Govindarajalu Hardware: The Complete Reference by C. Zacker, J. Rourke Hardware by Ron Gilster				

Session: 2024-25							
Part A - Introduction							
Subject	;		ELECTRONIC	EQUIPMENT & MAI	NTENA	NCE	
Semeste	er		SIXTH				
Name o	of the Course		Mobile Commu	nication			
Course	Code		B23-EEM-602				
Course DSEC/V	Type: (CC/MCC/MDC/ VOC/DSE/PC/AEC/VA	/CC-M/ C)	MCC-12				
Level of	f the course		300-399				
Pre-requ	uisite for the course	(if any)	Basic Knowledg	ge of Electronics			
Course Learning Outcomes (CLO): After completing this course, the learner will be able to: 1. Understand basics of mobile telecommunication system 2. Understand generations of telecommunication systems in wireless network 3. Understand the architecture of Wireless LAN technologies 4. Understand the functionality of network layer and Identify a routing protocol for a given Ad hoc networks 5. Learning the above through practicals					eless network routing protocol for		
Credits	3	The	eory	Practical		Total	
			3	1		4	
Contac	et Hours per week		3	2		5	
Max. N Interna End Te	Marks: 100(70 Theo Il Assessment Marks: 20 erm Exam Marks: 50 Th	ry + 30 Practical) Theory + 10 Pr neory + 20 Pract	l) ractical ical	Exam Time: 3 Hours Practical	Time: 3 Hours each for Theory & cal		
		Part B	- Contents of th	e Course			
 Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 							
Unit			Topics			Contact Hours	
Ι	Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies-MAC Protocols – SDMA- TDMA- FDMA- CDMA						
II MOBILE TELECOMMUNICATION SYSTEM : GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security –GPRS- UMTS- Architecture					rotocols Aobility	10	
III	III WIRELESS NETWORKS : LANs and PANs – IEEE 802.11 Standard – 12 Architecture – Services – Blue Tooth- Wi-Fi – WiMAX MOBILE NETWORK LAYER : Mobile IP – DHCP – Adhoc– Proactive and 12 Reactive Routing Protocols – Multicast Routing Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security Vehicular Ad Hoc networks 12					12	

IV	MOBILE TRANSPORT AND APPLICATION LAYER : Mobile TCP– WAP – Architecture – WDP – WTLS – WTP – WSP – WAE – WTA Architecture – WML	12			
V*	 V* Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Study of SDMA Trainer kit. 2. Study of TDMA Trainer kit. 3. Study of FDMA Trainer kit 4. Introduction to CDMA Trainer and PC interfacing using Serial Port 5. Study of GSM Trainer and PC interfacing using Serial Port 6. To understand the GSM Software Setting. 7. Prepare a wireless ad hoc network and show its working 				
	Suggested Evaluation Methods				
Intern: > Tł	al Assessment: heory (20 Marks)	End Term Examination:			
•	 Class Participation (5Marks) Seminar/presentation/assignment/quiz/class test etc. (5 Marks) Mid-Term Exam (10 Marks) 				
> Pı • •	 Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc. (10 Marks) Mid-Term Exam: 				
	Part C-Learning Resources				
 Recommended Books/e-resources/LMS: Jochen Schiller, —Mobile Communicationsl, PHI, Second Edition, 2003. Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computingl, PHI Learning Pvt.Ltd, New Delhi – 2012 Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, —Principles of Mobile Computingl, Springer, 2003. William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital Systemsl, Second Edition, Tata Mc Graw Hill Edition ,2006. C.K.Toh, —AdHoc Mobile Wireless Networks, First Edition, Pearson Education, 2002. 					

Session: 2024-25						
		Pa	rt A - Introduc	tion		
Subject	Subject ELECTRONIC EQUIPMENT & MAINTENANCE					
Semeste	er		SIXTH			
Name o	f the Course		Artificial Intelli	gence & Machine Learn	ning	
Course	Code		B23-EEM-603			
Course DSEC/V	Type: (CC/MCC/MDC/ /OC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-4			
Level of	f the course		300-399			
Pre-requ	uisite for the course	(if any)	Familiarity with write program a a windows envi	n basic concepts of pro lgorithms in a language ronment.	ogramm e of you	ing and the ability to r choice (e.g. C++) in
Course L (CLO):	 After completing this course, the learner will be able to: Student will be able to: Learn the basics and applications of artificial intelligence Analyze basic and advanced search techniques Learn and design intelligent agents for concrete computational problems. Understand the basics of Machine Learning. Hands on practicals related to AI & ML 					
Credits		The	eory	Practical		Total
			3	1		4
Contac	t Hours per week		3	2		5
Max. N Interna End Te	Aarks: 100 (70 Theo l Assessment Marks: 20 rm Exam Marks: 50 Th	ory + 30 Practica D Theory + 10 Pr neory + 20 Pract	al) Exam Time: 3 Hours each for Theory & Practical tractical			
		Part E	B- Contents of th	ne Course		
 Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 						
Unit			Topics			Contact Hours
Ι	AI problems, foundation of AI and history of AI intelligent agents: Agents and 11 Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.					
Π	IISearch Strategies: Solving problems by searching, Search- Issues in The Design of Search Programs, Un-Informed Search- BFS, DFS; Heuristic Search Techniques: Generate-And Test, Hill Climbing, Best-First Search, A* Algorithm, Alpha beta search algorithm, Problem Reduction, AO*Algorithm, Constraint Satisfaction, Means-Ends Analysis11					11
III	Introduction to ML:	Machine Learni	ng basics, Appli	cations of ML, Data N	<i>A</i> ining	12

	Vs Machine Learning vs Big Data Analytics. Supervised Learning- Naïve Base Classifier, Classifying with k-Nearest Neighbour classifier, Decision Tree classifier, Naive Bayes classifier. Unsupervised Learning - Grouping unlabeled items using k-means clustering, Association analysis with the Apriori algorithm Introduction to reinforcement learning						
IV	Forecasting and Learning Theory : Non-linear regression, Logistic regression, Random forest, Baysian Belief networks, Bias/variance tradeoff, Tuning Model Complexity, Model Selection Dilemma Clustering : Expectation-Maximization Algorithm, Hierarchical Clustering, Supervised Learning after Clustering, Choosing the number of clusters, Learning using ANN	11					
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1. Write a Program to Implement Breadth First Search. 2. Write a Program to Implement Depth First Search 3. Write a program to implement Hill Climbing Algorithm 4. Write a program to implement A* Algorithm 5. Write a program to implement AO* Algorithm 6. Write a program to implement Tic-Tac-Toe game 7. Implementation of Find S Algorithm 8. Implementation of Candidate elimination Algorithm 9. Write a program to implement simple Linear Regression and Plot the graph 	30					
	Suggested Evaluation Methods						
Intern > 1 • • •	nal Assessment: Theory(20 Marks) Class Participation: (5 Marks) Seminar/presentation/assignment/quiz/class test etc.: (5 Marks) Mid-Term Exam: (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.: (10 Marks) Mid-Term Exam:	End Term Examination: 50 Marks 20 Marks					
	Part C-Learning Resources						
Reco	mmended Books/e-resources/LMS:						
1.	S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Security	ond Edition, Pearson					
2.	2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.						
3.	G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solverson Education.	ving", Fourth Edition,					
1	A D Joshi Mashina Larring and Artificial Intelligence Springer 2020						

4. B Joshi, Machine Learning and Artificial Intelligence, Springer, 2020.

	Session: 2024-25					
		Р	Part A - Introdu	iction		
Subject	Subject ELECTRONIC EQUIPMENT & MAINTENANCE					
Semeste	PT		SIXTH			
Name o	f the Course		IOT basics and	applications		
Course	Code		B23-EEM-604			
Course ⁷ DSEC/V	Type: (CC/MCC/MDC/ /OC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-4			
Level of	f the course		300-399			
Pre-requ	usite for the course	(if any)	Knowledge of	Electronics		
 Course Learning Outcomes (CLO): After completing this course, the learner will be able to: Learn basic concepts, principles and challenges in IoT. Understand functioning of hardware devices and sensors used for IoT. Analyze network communication aspects and protocols used in IoT anapplication implementation of Arudino. To develop IoT infrastructure for popular applications Solving Societal problems with the help of IOT 				rs used for IoT. ols used in IoT and		
Credits		The	eory	Practical		Total
			3	1		4
Contac	t Hours per week		3	2		5
Max. M Interna End Te	Marks:100(70 Theorem1 Assessment Marks:20orm Exam Marks:50 Theorem	ry + 30 Practical D Theory + 10 Pr heory + 20 Pract	l) ractical ical	Exam Time: 3 Hours	s each for	Theory & Practical
		Part	B- Contents of	the Course		
 Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 						
Unit			Γορις			Contact Hours
Ι	I Internet of Things (IoT): Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples. Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, communication technologies, data enrichment and consolidation, ease of designing and affordability					11
Π	Hardware for IoT: Se (RFID) technology, w Network & Commun protocol survey, Surv Data aggregation & di	nsors, Digital so ireless sensor ne nication aspects yey routing pro- ssemination	ensors, actuators, etworks, participa s in IoT : Wireles tocols, Sensor d	, radio frequency ident tory sensing technolog ss Medium access issue eployment & Node di	ification y. ss, MAC scovery,	10

III	 III Embedded Platforms for IoT: Embedded computing basics, Overview and comparison of IOT supported Hardware platforms such as Arduino, NetArduino, Raspberry pi, Beagle Bone, Intel Galileo boards and ARM cortex. Programming the Ardunio: Ardunio Platform Boards Anatomy, Ardunio IDE, coding, using emulator, using libraries, additions in ardunio, programming the ardunio for IoT 					
IV	Challenges in IoT Design challenges: Development Challenges, Security Challenges, Other challenges IoT Applications: Smart Metering, E-health, City Automation, Automotive Applications, home automation, smart cards, communicating data with H/W units, mobiles, tablets, Designing of smart street lights in smart city.	12				
V*	 V* Students should implement two case studies from the IOT Projects List (Individually or in small group): Wearable Computer With Temperature Distance Sensors Weather Imaging CubeSat with Telemetry Transmission IOT Water Pollution Monitor RC Boat Mountain Climber Health & GPS Tracker IOT Smart Parking Using RFID IOT Contactless Covid Testing Booth Automation IOT Social Distancing & Monitoring Robot For Queue IOT Covid Patient Health Monitor in Quarantine IOT based Manhole Detection and Monitoring System IOT based Smart Energy Meter Monitoring with Theft Detection IOT Weather Station Airship 13. IOT based Three Phase 					
	Suggested Evaluation Methods					
Intern ≻ T] •	End Term Examination: 50 marks					
> P • •	20 marks					
Part C-Learning Resources						
Recommended Books/e-resources/LMS: 1. Olivier Hersent, DavidBoswarthick, Omar Elloumi"The Internet of Things key applications and protocols", willey 2. Jeeva Jose Internet of Things Khanna Publishing House						

Jeeva Jose, Internet of Things, Khanna Publishing House
 Michael Miller "The Internet of Things" by Pearson
 Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1ST Edition, 2016
 ArshdeepBahga, Vijay Madisetti "Internet of Things (A hands on approach)" 1ST edition, VPI publications,2014
 Adrian McEwen,Hakin Cassimally "Designing the Internet of Things" Wiley India

	Session: 2024-25						
		Р	art A - Introdu	iction			
Subject			ELECTRONIC	ELECTRONIC EQUIPMENT & MAINTENANCE			
Semeste	er		SIXTH				
Name o	f the Course		Advanced Emb	edded Systems			
Course	Code		B23-EEM-605				
Course T DSEC/V	Type: (CC/MCC/MDC/ /OC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-5				
Level of	f the course		300-399				
Pre-requisite for the course (if any)Familiarity with basic concepts of programming and the ability write program algorithms in a language of your choice (e.g. C++) is windows environment.					ng and the ability to choice (e.g. C++) in a		
Course Learning Outcomes After completing this course, the learner will be able to: (CLO): Student will be able to: 1. Understand the Embedded system, Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits. 2. Recognize the need of Embedded system 3. Learn the hardware aspects of embedded systems 4. Understand RTOS based Embedded Systems 5. Hands on with Arduino/Raspberry Microcontrollers				hip (SoC) and the use			
Credits		The	eory	Practical		Total	
			3	1		4	
Contac	t Hours per week		3	2		5	
Max. M Interna End Te	Marks: 100 (70 Theo 1 Assessment Marks: 20 rrm Exam Marks: 50 Th	bry + 30 Practica D Theory + 10 Pr heory + 20 Pract	I) Exam Time: 3 Hours each for Theory & Practical ical				
		Part	B- Contents of	the Course			
 Instructions for Paper- Setter Nine questions will be set in all. All questions will carry equal marks. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 					be compulsory. The h Unit I to IV. The ng one question from		
Unit			Topics			Contact Hours	
Ι	Advanced Embedded Systems Architectures: Features of Arduino Microcontroller, Architecture of Arduino, Different boards of Arduino. Fundamental of Arduino Programming, in built functions and libraries. Serial Communication between Arduino hardware and PC and Arduino Interrupt Programming. Experimental embedded platform like Raspberry Pi. Standards IEEE 1275.1-1994 and IEEE 1754.11						
Π	Real Time Operating System Basics, Ty Multiprocessing and Synchronization, Co Operations and Use, I	g Systems (RTO pes of Operat Multitasking, communication Exceptions, Inte	S) Based Ember ing Systems, Task Scheduling and Concurren rrupts and Timer	Ided System Design: C Tasks, Process and g, Task Operations, S cy Defining Sem s Exceptions, Interrupts	Deprating Threads, Structure, aphores, 5,	11	

	Applications, Processing of Exceptions and Spurious Interrupts, Real Time CLO scks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers	
III	Sensors, ADCs and Actuators Sensors: Temperature Sensor, Light Sensor, Proximity/range Sensor; Analog to digital converters: ADC Interfacing; Actuators Displays, Motors, Optocouplers/Opto isolators, relays.	12
IV	Examples of embedded systems Mobile phone, automotive electronics, radio frequency identification (RFID), wireless sensor networks(WISENET), robotics, biomedical applications, brain machine interface	11
V*	 Note: A candidate is required to perform minimum 5 experiments out of the list provided during course of study in this semester. 1.Introduction to Arduino UNO/ Raspberry Pi 2.Programming based on Arduino UNO/ Raspberry Pi 3.Digital Input & Digital Output: Experiments on digital input and digital output on Arduino Mega board and using LED and Buzzer. 4.LCD Display: Experiment on LCD display:-Print numbers, Name, Time etc. 5. Interface an IR sensor with a microcontroller and decode signals from a remote control. Use it to control devices or systems 6. Temperature Sensor: Use a temperature sensor (like DS18B20) to measure and display the temperature on an LCD or through a serial monitor. 7. Explore real-time operating systems (RTOS) by implementing a simple task scheduler on a microcontroller. 8. Control a DC motor or a stepper motor using a microcontroller. Experiment with different speed control techniques. 9. Connect an ultrasonic sensor to measure distances and display them on an LCD or serial monitor. 10. Use a sound sensor to detect claps or loud sounds and trigger an action (e.g., turning on an LED). 11. Use a Piezo buzzer to play simple melodies or tunes. 12. Any Project based on Arduino UNO/Raspberry Pi 	30
	Suggested Evaluation Methods	
Intern > T • • • • • • •	al Assessment: heory (20 Marks) Class Participation: (5 Marks) Seminar/presentation/assignment/quiz/class test etc.: (5 Marks) Mid-Term Exam: (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.: (10 Marks) Mid-Term Exam:	End Term Examination: 50 Marks 20 Marks
	Part C-Learning Resources	
Recon	 Raj Kamal, Embedded System Architecture, Programming and Design, Tata McGraw Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill. Programming Embedded Systems in C and C++, First Edition January, Michael Barr Kanta Rao B, Embedded Systems, 1st Ed., PHI Frank Vahid & Tony Givargis, Embedded System Design, 2nd Edition, John Wi Embedded Systems – Dorling Kindersley (2005) Embedded Systems – Lyla, Pearson, 2013. 	v Hill, (2004). ley, Simon, D.E., An

Session: 2024-25						
Part A - Introduction						
Subject			ELECTRONIC	EQUIPMENT & MAI	NTENANCE	
Semeste	er		SIXTH			
Name o	f the Course		Advanced Micr	oprocessors		
Course	Code		B23-EEM-606			
Course DSEC/V	Type: (CC/MCC/MDC/ /OC/DSE/PC/AEC/VA	/CC-M/ C)	DSE-5			
Level of the course 300-399						
Pre-requ	uisite for the course	(if any)	Knowledge of b	pasic processors and the	ir programmi	ng
Course Learning Outcomes (CLO):After completing this course, the learner will be able to: Student will be able to: 1. Understand the concept of advanced microprocessors and their uses 2. Learn the difference between architectures of various microprocessors 3. understand the programming and concept of 8051 Microcontrollers and its interfacing 4. understand the programming and concept of PIC microcontroller 5. Hands on practicals based on advanced microprocessors					es ssors controllers and its	
Credits	3	The	eory	Practical		Total
			3	1	4	
Contac	t Hours per week		3	2	5	
Max. N Interna End Te	Marks: 100 (70 Theo 1 Assessment Marks: 20 20 Prm Exam Marks: 50 Th	ory + 30 Practica 0 Theory + 10 Pr neory + 20 Pract	ll) ractical ical	Exam Time: 3 Hours	each for The	ory & Practical
		Part	t B- Contents of	the Course		
1. Nin 2. Que eight c attemp	Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.					
Unit			Topics			Contact Hours
I	Intel 80386 Microprocessor: Architecture - Registers - Descriptors - Real Mode -11Protected mode - Virtual 8086 mode - Paging and Segmentation - Comparison with80486 Microprocessor. Pentium class of processors: RISC and CISC architectures -Superscalar Architecture - MMX technology - SSE - Pipelining - Branch Prediction11techniques - FPU - Comparative study of features of Pentium-II, Pentium-III andPentium-IV processors.					
Π	II Intel 64 bit processors-: Overview of 64 bit processor execution environment – Memory organization – IA-32 memory models – Memory organization in 64 bit mode – Extended physical addressing in protected mode - Basic program execution registers – Operand addressing. Multicore Architectures: Concepts – Power reduction techniques in processors – Comparison of Intel Skylake, Goldmont and Ice Lake micro architectures 11					
III	8051 microcontroller	: Architecture -	pin configuration	on - addressing modes	- instruction	12

	set – programming - timers – counters - Programming - interrupts- communication interfaces - interfacing with DAC, ADC, stepper motor	
IV	PIC micro controllers: PIC family - PIC16F84A: Features - architecture – data memory organization – RAM - Program memory - ROM – instruction types and addressing modes- instruction cycle -ports - Introduction to programming PIC microcontrollers using MPLAB.	11
V*	 Note: Perform atleast six Practicals : Interfacing experiments with 8051/PIC using Kit: 1. Display (LED/Seven segments/LCD) and keyboard interface. 2. ADC interface. 3. DAC interface with wave form generation. 4. Stepper motor and DC motor interface. 5. Realization of Boolean expression through port. 6. Study and Analyzing interfacing of graphical LCD using 8051/8951 7. Study and Analyzing interfacing of graphical LCD using PIC 8. ALP for pressure and Temperature measurement 9. ALP to generate 10KHZ Square wave 	30
Suggested Evaluation Methods		
Intern > T • • • • •	al Assessment: heory(20 Marks) Class Participation: (5 Marks) Seminar/presentation/assignment/quiz/class test etc.: (5 Marks) Mid-Term Exam: (10 Marks) Practicum (10 Marks) Class Participation: Seminar/Demonstration/Viva-voce/Lab records etc.: (10 Marks) Mid-Term Exam:	End Term Examination: 50 Marks 20 Marks
Part C-Learning Resources		
 Recommended Books/e-resources/LMS: Douglas V Hall, "Microprocessor & Interfacing: Programming and Hardware", Tata McGraw Hill, 2nd Edition,2006. Lyla B. Das, The x86 Microprocessors: 8086 to Pentium, Multi cores, Atom and the 8051 Microcontroller, 2/e, Pearson Education. ISBN-13: 978-9332536821. Barry B. Brey, The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit Extensions : Architecture, Programming, and Interfacing, Pearson Education India, ISBN:9788131726228. 8051 Microcontrollers and Embedded Systems, Mohammad Ali Mazidi, Pearson 		
5. 6. 7.	 Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers, Newnes Publisher, ISBN:9780080961842. PIC: 18F2420, 16F84A data sheet ,by Microchip. Intel® 64 and IA-32 Architectures Software Developer's Manual: Vol. 	
6. The wherecondromers and Emocuded Systems, wionanninad An Mazidi, Pearson		