G. PULLA REDDY ENGINEERING COLLEGE (Autonomous): KURNOOL

Accredited by NBA of AICTE and NAAC of UGC
An ISO 9001:2008 Certified Institution
Affiliated to JNTUA, Anantapur

Scheme – 2017

Scheme and Syllabus for III to VIII Semester of
B.Tech. Degree Programme in
Electronics and Communication Engineering
G. Pulla Reddy Engineering College (Autonomous): Kurnool
Accredited by NBA of AICTE and NAAC (A+) of UGC
An ISO 9001:2008 Certified Institution
Affiliated to JNTUA, Anantapuramu.

FOUR YEAR B.Tech DEGREE COURSE

Scheme of instruction and Examination

(Effectivefrom2017-18)

(For CSE, ECE)

ISemester Scheme:2017

S.No.	Subject	Code	Credits	Scheme of Instruction Periods/ Week			Duration of End Exam (Hours)	Scheme of ExaminationMax Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Engineering Mathematics – I	BS101	3	3	-	-	3	60	40	100
2	Computer Programming	CS101	3	3	-	-	3	60	40	100
3	Professional Communication and English – I	HU101	3	3	-	-	3	60	40	100
4	Elements of Electrical Engineering	EE101	3	3	-	-	3	60	40	100
5	Basic Electronics Engineering	EC101	3	3	-	-	3	60	40	100
6	Engineering Mechanics	CE101	3	3	-	-	3	60	40	100
II	**Practicals**									
7	Computer Programming Lab	CS102	1	-	-	2	3	50	50	100
8	Phonetics & Communication Skills Lab	HU103	1	-	-	2	2	50	50	100
9	Engineering Workshop	ME102	1	-	-	2	3	50	50	100
Total			**21**	**18**	**-**	**6**		**510**	**390**	**900**

IISemester Scheme:2017

S.No.	Subject	Code	Credits	Scheme of Instruction Periods/ Week			Duration of End Exam (Hours)	Scheme of ExaminationMax Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Engineering Mathematics – II	BS102	3	3	-	-	3	60	40	100
2	Data Structures	CS103	3	3	-	-	3	60	40	100
3	Professional Communication and English – II	HU102	3	3	-	-	3	60	40	100
4	Applied Physics	BS103	3	3	-	-	3	60	40	100
5	Engineering Chemistry	BS105	3	3	-	-	3	60	40	100
6	Engineering Drawing	ME101	3	-	3	-	3	60	40	100
II	**Practicals**									
7	Data Structures Lab	CS104	1	-	-	2	3	50	50	100
8	Applied Physics Lab	BS104	1	-	-	2	2	50	50	100
9	Engineering Chemistry Lab	BS106	1	-	-	2	2	50	50	100
Total			**21**	**15**	**3**	**6**		**510**	**390**	**900**

FOUR YEAR B.TECH. DEGREE COURSE

Scheme of Instruction and Examination
(Effective from 2017-2018)

B.Tech. ECEIIISemester **Scheme:2017**

S. No	Course Code	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	T	P	End Exam	Internal Assessment	Total
I		**Theory**							
1	HU201	Managerial Economics and Financial Accountancy (MEFA)	3	3	0	0	60	40	100
2	EC201	Electronic Devices & Circuits (EDC)	3	3	0	0	60	40	100
3	EC202	Digital System design (DSD)	3	3	0	0	60	40	100
4	EC203	Signals and Systems (SAS)	3	3	0	0	60	40	100
5	EC204	Probability Theory & Stochastic processes (PTSP)	3	3	0	0	60	40	100
6	EE210	Network Analysis (NA)	3	3	0	0	60	40	100
7	ML202	Constitution of India/PEHV/Essence of Indian Traditional Knowledge	-	2	0	0	-	-	-
II		**Practical**							
8	EC205	Electronic Devices & Circuits Lab (EDC(P))	1	0	0	2	50	50	100
9	EC206	Basic Simulations Lab (BS(P))	1	0	0	2	50	50	100
10	HU203	Advanced Communication Skills Lab (ACS(P)	1	0	0	2	0	100	100
		Total	21	20	0	6			**900**

FOUR YEAR B.TECH. DEGREE COURSE

Scheme of Instruction and Examination
(Effective from 2017-2018)

B.Tech. ECEIVSemester **Scheme:2017**

S.No	Course Code	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	T	P	End Exam	Internal Assessment	Total
I		**Theory**							
1	EC207	Analog Electronic Circuits(AEC)	3	3	0	0	60	40	100
2	BS203	Complex Variables and Special Functions (CVSF)	3	3	0	0	60	40	100
3	EC208	Electromagnetic waves (EMW)	3	3	0	0	60	40	100
4	EC209	Networks & Transmission Lines(NTL)	3	3	0	0	60	40	100
5	EC210	Computer Organization & Architecture (COA)	3	3	0	0	60	40	100
6	EE211	Electrical Technology (ET)	2	2	0	0	60	40	100
7	ML201	Environmental Studies(ES)	-	2	0	0	-	-	-
II		**Practical**							
8	EC211	Analog Electronic Circuits Lab(AEC(P))	1	0	0	2	50	50	100
9	EE212	Electrical Circuits and Machines Lab (ECM(P))	1	0	0	2	50	50	100
10	HU204	Soft Skills Lab (SS(P))	1	0	0	2	0	100	100
		Total	20	19	0	6			**900**

FOUR YEAR B.TECH. DEGREE COURSE

Scheme of Instruction and Examination
(Effective from 2017-2018)

B.Tech. ECEVSemester **Scheme:2017**

S. No.	Course Code	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	D/T	P	End Exam	Internal Assessment	Total
I		**Theory**							
1	EC301	Analog and Digital Communications (ADCM)	4	4	0	0	60	40	100
2	EC302	Microprocessors & Micro Controllers (MPMC)	3	3	0	0	60	40	100
3	EC303	Introduction to VLSI Design (IVLSID)	3	3	0	0	60	40	100
4	EC304	Linear IC Applications (LICA)	3	3	0	0	60	40	100
5		Professional Elective –I	2	3	0	0	60	40	100
6		Open Elective-I	3	3	0	0	60	40	100
II		**Practical**							
7	EC305	Analog and Digital Communication Lab (ADCM(P))	1	0	0	2	50	50	100
8	EC306	Microprocessors & Micro Controllers Lab (MPMC(P))	1	0	0	2	50	50	100
9	EC307	Linear IC Applications Lab (LICA(P))	1	0	0	2	50	50	100
		Total	21	19	0	6			**900**

FOUR YEAR B.TECH. DEGREE COURSE

Scheme of Instruction and Examination
(Effective from 2017-2018)

B.Tech. ECEVISemester **Scheme:2017**

S. No.	Course code	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	D/T	P	End Exam	Internal Assessment	Total
I		**Theory**							
1	EC308	Embedded Systems and Programming (ESP)	3	3	0	0	60	40	100
2	EC309	Digital Signal Processing (DSP)	3	3	0	0	60	40	100
3	EC310	Antenna & Wave propagation (AWP)	3	3	0	0	60	40	100
4	EE311	Linear Control Systems (LCS)	3	3	0	0	60	40	100
5		Professional Elective –II	3	3	0	0	60	40	100
6		Open Elective-II	3	3	0	0	60	40	100
II		**Practical**							
7	EC311	Digital Signal Processing Lab(DSP(P))	1	0	0	2	50	50	100
8	EC312	VLSI &Embedded Systems Lab (VES(P))	1	0	0	2	50	50	100
9	ECMP1	Mini Project 1	2	0	0	4	-	100	100
		Total	22	18	0	8			**900**

FOUR YEAR B.TECH. DEGREE COURSE

Scheme of Instruction and Examination
(Effective from 2017-2018)

B.Tech. ECEVIISemester **Scheme:2017**

S. No.	Course code	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	D/T	P	End Exam	Internal Assessment	Total
I		**Theory**							
1	EC401	Microwave Engineering (MWE)	3	3	0	0	60	40	100
2	EC402	Digital System Design using Verilog (DSDV)	3	3	0	0	60	40	100
3		Professional Elective –III	3	3	0	0	60	40	100
4		Professional Elective –IV	3	3	0	0	60	40	100
5		Open Elective-III	3	3	0	0	60	40	100
6		Open Elective-IV	3	3	0	0	60	40	100
II		**Practical**							
7	EC403	Microwave Communications Lab (MWC (P))	1	0	0	2	50	50	100
8	EC404	Digital System Design Lab (DSD(P))	1	0	0	2	50	50	100
9	ECMP2	Mini Project 2	2	0	0	4	-	100	100
		Total	22	18	0	8			**900**

FOUR YEAR B.TECH. DEGREE COURSE

Scheme of Instruction and Examination
(Effective from 2017-2018)

B.Tech. ECEVIIISemester **Scheme:2017**

S. No.	Course code	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	D/ T	P	End Exam	Internal Assessment	Total
I		**Theory**							
1		Professional Elective-V	3	3	0	0	60	40	100
2		Professional Elective –VI	3	3	0	0	60	40	100
II		**Practical**							
	ECP1	Project Work (PW(P))	6	0	0	12	50	50	100
		Total	12	6	0	12			300
OR									
		Internship	6	-	-	-	50	50	100
	ECP1	Project work	6	-	-	-	50	50	100
		Total	**12**	**-**	**-**	**-**			**200**

Electives offered by ECE department

Course code	Course Title	
Professional Elective-I		**Stream**
ECEL1	Python Programming	Programming oriented course
ECEL2	Electronic Measurements & Instrumentation	Instrumentation
ECEL3	Advanced Computer Architectures	Computer oriented course
Professional Elective-II		**Stream**
ECEL4	Data Communications & Networking	Communication Network Engineering
ECEL5	Analog VLSI	VLSI
ECEL6	Internet of Things	Embedded systems
Professional Elective-III		**Stream**
ECEL7	Coding Techniques	Communication Engineering
ECEL8	Embedded RTOS	Embedded systems
ECEL9	Digital Image Processing	Image Processing
Professional Elective-IV		**Stream**
ECEL10	Fiber Optic Communications	Communication Engineering
ECEL11	Advanced Digital signal processing	Signal Processing
ECEL12	Low Power VLSI	VLSI
Professional Elective-V		**Stream**
ECEL13	Cellular & Mobile Communications	Communication Engineering
ECEL14	VLSI Design for Testability	VLSI
ECEL15	Radar &Satellite Systems	RF &Microwave Engineering
Professional Elective-VI		**Stream**
ECEL16	Wireless Communications	Communication Engineering
ECEL17	FPGAs & ASIC Architectures and Applications	VLSI
ECEL18	Adaptive Signal Processing	Signal Processing

Open Electives-1: (IDE)- Semester - V		**Offered by the Department**
OE301	Artificial Intelligence & Expert Systems	CSE
OE302	Introduction to Information Systems	CSE
OE303	Web Development Programming	CSE
OE304	Introduction to Cyber Security	CSE
OE305	Internet of Things	ECE
OE306	Nano Technology	ECE
OE307	Remote Sensing & GIS	CE
OE308	Optimization Techniques	ME
OE309	Renewable Energy	EEE
OE310	Introduction to JAVA	CSE

Open Electives-2 : (IDE)- Semester - VI		
OE311	OOP through JAVA	CSE
OE312	Ethical Hacking	CSE
OE313	Principles of Programming Languages	CSE
OE314	Advanced Information Systems	CSE
OE315	Scientific Programming with Python	CSE
OE316	Fuzzy Logic & Neural Networks	ECE
OE317	Building Information Modeling	CE
OE318	Product Lifecycle Management	ME
OE319	Simulation of Engineering Systems	EEE
Open Electives-3 :(IDE)- Semester - VII		
ECOE1	Scripting Languages for VLSI	ECE
ECOE2	Bio-Medical Electronics	ECE
ECOE3	Distributed Embedded Systems	ECE
Open Electives-4 :(IDE)- Semester - VII		
ECOE4	VLSI Signal Processing	ECE
ECOE5	Cognitive Radio	ECE
ECOE6	Robotics and Automation	ECE

SEMESTER	**CREDITS**
I Semester	**21**
II Semester	**21**
III Semester	**21**
IV Semester	**20**
V Semester	**22**
VI Semester	**21**
VII Semester	**22**
VIII Semester	**12**
TOTAL	**160**

S. No	Course Component	Total Number of Credits	Curriculum Content (% of Total No. of Credits of the Program)
1	Basic Sciences	20	12.5
2	Engineering Sciences	21	13.12
3	Humanities and Social Sciences	10	6.25
4	Program Core	67	41.88
5	Program Electives	12	7.5
6	Open Electives	12	7.5
7	Project(s)	10	6.25
8	Internships	06	3.75
9	Mandatory Learning Courses	Non Credit Courses	-
10	Employability Enhancement Courses	02	1.25
Total		**160**	100

MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTACY (MEFA)

III Semester: Common for CSE and ECE						Scheme: 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
HU201	Foundation	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional ExamDuration:2 Hrs						EndExamDuration:3 Hrs		

CourseOutcomes: At the end of the course students will be able to

CO1: Understandthenatureandscopeofmanagerialeconomicsandvariousconceptsofdemand analysis

CO2: Understand the significance of demand elasticity and different concepts of demand forecasting

CO3: Understandtheconceptsofproductionandcostanalysisanddifferentmarketstructuresand their competitivesituations

CO4: Understand the concept and significance of capital budgeting

CO5: Understand the principles and significance of accountancy and preparation of final accounts

UNIT–I

Introduction to Managerial Economics & Demand :

Managerial Economics- *Definition, Nature and Scope; Demand* -Meaning, *Types of Demand, Demand Determinants, Law of Demand and its exceptions, Law of Diminishing Marginal Utility, Indifference curve.*

UNIT– II

Elasticity of Demand and Demand Forecasting:

Elasticity of Demand*-Types, Measurement and Significance;*
Demand forecasting *–Importance, Factors, Purposes, Methods of Demand Forecasting*

UNIT– III

Theory of production & cost analysis and Market Structures

Production Analysis*: Meaning, Isoquants & Isocosts, The law of diminishing Marginal Returns, Law of Returns to Scale, Internal and External Economies of scale.*
Cost Analysis *– Cost concepts, Cost output relationship for Short Run and Long Run, Break Even Analysis – Its Importance, Limitations and Managerial uses*
Market Structures: *Types and Features of different market structures–Perfect Competition – Monopoly – Monopolistic and Oligopolistic; Price output determination in case of perfect*

UNIT– IV

Capital and CapitalBudgeting

Introduction: *significance of capital budgeting, steps in capital budgeting, optimum level of capital, decision to invest under certainty-payback period method, net discounted present value method, internal rate of return method, sources of capital, decision to invest under risk and uncertainty*

UNIT– V

Introduction to FinancialAccountancy

Principles of Accountancy: *Introduction, Double Entry System of Book Keeping-, Journal, Ledger, Preparation of Trial balance* ***Preparation of Final Accounts:*** *Trading Account, Profit & Loss Account, and Balance Sheet with adjustments, Final Accounts problems.*

Text Books :

1. A.R. Aryasri, Managerial Economics and Financial Analysis, McGrawHill Education Edition-2011.

Reference Books :

1) Varshiney and Maheswari, Managerial Economics, Sultan Chand & Co, New Delhi

2) Vanita Agarwal, Managerial Economics, Pearson Education

3) Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson

4) S.P.Jain and K.L.Narang, Financial Accounting

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question paper contains Six questions; question 1 contains 5 short answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions .i.e. there will be two questions from each unit and the student should answer any one question.

ELECTRONIC DEVICE S AND CIRCUITS (EDC)

<table>
<tr><td colspan="5">III Semester: Common for ECE & EEE</td><td colspan="4">Scheme : 2017</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">EC201</td><td rowspan="2">PC</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration:2 Hrs</td><td colspan="4">End Exam Duration: 3Hrs</td></tr>
<tr><td colspan="9">Course Outcomes: At the end of the course students will be able to</td></tr>
<tr><td colspan="9">CO1: Design rectifiers, wave shaping circuits and describe the behavior of special purpose diodes.</td></tr>
<tr><td colspan="9">CO2: Apply various biasing techniques to BJT, JFET and MOSFET</td></tr>
<tr><td colspan="9">CO3: Analyze Single stage amplifiers using BJT</td></tr>
<tr><td colspan="9">CO4: Analyze the effect of cascading on amplifier Circuits</td></tr>
<tr><td colspan="9">CO5: Understand small signal low frequency models for JFET and MOSFET amplifiers.</td></tr>
<tr><td colspan="9"></td></tr>
<tr><td colspan="9"><u>UNIT-I</u></td></tr>
<tr><td colspan="9">Diode Applications:
Rectifiers with filters: Half wave rectifier, Full wave rectifier, bridge rectifier and their analysis with L,C,LC filters
Linear Wave Shaping: RC network as differentiator and integrator
Non Linear Wave shaping: Series & Shunt Diode clippers, Clampers- positive & negative clampers, Clamping circuit theorem.
Special Purpose Diodes: Schottky Diode, SCR, Tunnel Diode, UJT, Varactor diode, Solar cell.</td></tr>
<tr><td colspan="9"><u>UNIT-II</u></td></tr>
<tr><td colspan="9">Transistor Biasing:
Need for biasing, Operating point, DC and AC load lines, Bias stabilization techniques: fixed bias, collector to base bias, self bias, Stabilization against variations in I_{CO}, VBE and β for the self bias circuit, Bias compensation techniques, Thermal runaway and thermal stability, Eber‘s mollmodel.
FET&MOSFET Biasing:
DC load line and region of operation, Common-MOSFETs configurations, Design and analysisofvariousJFET&MOSFETbiasingcircuits,IntroductiontoCNTFET(elementary treatment)</td></tr>
<tr><td colspan="9"><u>UNIT-III</u></td></tr>
<tr><td colspan="9">Single Stage Amplifiers:
Two port device and hybrid Model, transistor hybrid Model, Analysis of a transistor amplifier circuit using h Parameters, Graphical determination of h parameters, Small signal model of bipolar junction transistor, Comparison of CB, CC and CE amplifier, Approximate CE, CB and CC models, Linear analysis of transistor amplifier circuits, Miller‘s Theoremand its Dual, CE amplifier with emitter resistor, Emitter Follower.</td></tr>
<tr><td colspan="9"><u>UNIT-IV</u></td></tr>
<tr><td colspan="9">Multistage Transistor Amplifiers:
Types of coupling-RC coupled, Direct coupled, Analysis of two stage RC coupled amplifier, Darlington, Bootstrap and Cascode amplifiers.</td></tr>
</table>

UNIT-V

FET and MOSFET Amplifiers:

Small signal model of JFET, Analysis of CS, CD JFET amplifiers. Depletion and enhancement types of MOSFETs, Operation & Characteristics, Basic concepts of MOS amplifies, MOS small signal model. Common source amplifiers with resistive, diode and current source loads.

Text Books:

1. Milliman and Halkis: *"Integrated Electronics"*, Tata Mc.Graw Hill, 2004.
2. R.E.Boylstead and L.Nashelsky: *"Electronic Devices and Circuit Theory"*, 9/e, Pearson Education,2007.
3. David Bell, *"Electronic Devices and Circuits"*- 5th Edition, Oxford,2008.
4. J.Milliman, C.Halkias & Satyabrata Jit, *"Electronic Devices and Circuits"*, 2nd Edition, TMH, 2007
5. B.Razavi, *"Design of Analog CMOS Integrated Circuits"*. 1st edition, TMH.(For MOSFET amplifiers), 2002.
6. H.-S. Philip Wong, Deji Akinwande, *"Carbon Nanotube and Graphene Device Physics"*, Cambridge University Press 1st edition 2010.

Reference Books:

1. Ben.G.Streetman , *"Solid state electronic devices"*, Pearson, 2015
2. Nagrath , *"Analog and Digital Circuits"*, 2nd edition, PHI,2013.
3. G. K. Mithal , *"Electronic Devices and Circuits"*, 23rd Edition, Khanna pub. 2006
4. Bogart Theodore, *"Electronic Devices and Circuits"*, 6th Edition, PE 2008.
5. Allen Mottershed, *„Electronics devices and circuits"*, 1st Edition, PHI, 1973.
6. N.N Bhargava, D.C. Kulshreshtha, S.C Gupta, NITTTR – Chandigarh, *"Basic Electronics and Linear Circuits"*,2nd edition, McGraw Hill Education(India) Pvt Ltd, 2013

Web References:

https://www.electronics-tutorials.ws

w*ww.informationvine.com*

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question paper contains Six questions; question 1 contains 5 short answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is fromone unit and may contain sub-questions .i.e. there will be two questions from each unit and the student should answer any onequestion.

DIGITAL SYSTEM DESIGN (DSD)

<table>
<tr><td colspan="5">III Semester :Common for ECE&EEE</td><td colspan="4">Scheme : 2017</td></tr>
<tr><td>Course Code</td><td>Course Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">EC202</td><td rowspan="2">PC</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>TOTAL</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration : 2 Hrs</td><td colspan="4">End Exam Duration: 3 Hrs</td></tr>
<tr><td colspan="9">Course Outcomes : At the end of the course the student will be able to</td></tr>
<tr><td colspan="9">CO1: Apply the basic knowledge of number systems, Boolean algebra to solve simple problems</td></tr>
<tr><td colspan="9">CO2: Understand Boolean algebra, and apply it to minimize and realize Boolean functions</td></tr>
<tr><td colspan="9">CO3: Design various common combinational logic circuits</td></tr>
<tr><td colspan="9">CO4: Design simple sequential logic circuits</td></tr>
<tr><td colspan="9">CO5: Distinguish types of FSMs and design them by following the standard procedure</td></tr>
<tr><td colspan="9"></td></tr>
<tr><td colspan="9">UNIT – I</td></tr>
<tr><td colspan="9">Number System & Boolean Algebra
Binary numbers, Number-base Conversions, Octal and Hexadecimal numbers, Complements of numbers, Signed binary numbers, Binary codes, binary logic; Boolean Algebra: basic definitions, basic theorems and properties, Boolean functions, canonical and standard forms, all logic functions of two variables, digital logic gates</td></tr>
<tr><td colspan="9">UNIT – II</td></tr>
<tr><td colspan="9">Minimization & Realization Methods
2,3,4,5 -variable Karnaugh map (K-map) method, prime implicants, essential prime implicants, POS, SOP simplifications,simplificationswithdon‘t caresconditions,NAND/NORimplementationsofdigitalgates, 2-level and multi-level NAND/NOR realizations, AND-OR-INVERT(AOI),OR-AND-INVERT(OAI), Quine-McCluskey (QM) Technique or Tabulation Method</td></tr>
<tr><td colspan="9">UNIT – III</td></tr>
<tr><td colspan="9">Combinational Logic Design
Combinational circuits, analysis & design procedures, half-adder, full-adder, binary adder, carry look ahead adder, half-subtractor, full-subtractor, binary adder with subtractor, BCD adder, binary multiplier, magnitude comparator, decoder and its applications for combinational logic implementation, encoder, priority encoder, multiplexer (MUX),combinational logic implementation using MUX, hazards in combinational logic</td></tr>
<tr><td colspan="9">UNIT – IV</td></tr>
<tr><td colspan="9">Sequential Logic Design
Sequential circuit, types of sequential circuits, latches, flip-flops, excitation tables, flip-flop conversions, registers, shift registers and its types, counters: ripple counter, BCD ripple counter, synchronous counter, Ring counter, Johnson counter</td></tr>
<tr><td colspan="9">UNIT –V</td></tr>
<tr><td colspan="9">Finite State Machines
Mealy and Moore state machines, Algorithmic State Machines, ASM chart, Design examples(ASMD chart), design of asynchronous sequential circuits, state reduction and flow tables, race-free state assignment, hazards, design examples.</td></tr>
</table>

Text Books :

1. Mano, Morris. M and Ciletti, Michael D, *Digital Design with an Introduction to Verilog HDL*, 5th edition, Pearson, New Delhi,2013
2. Jain, R. P., *Modern Digital Electronics*, 4th edition, Tata McGraw-Hill Education, New Delhi, 2010

Reference Books :

1. Kumar,Anand. A., *Fundamentals of Digital Circuit*, 4th Edition, Prentice-Hall India, New Delhi, 2016
2. Fletcher, W.L., *An Engineering Approach to Digital Design*, Pearson India, 2015
3. Kohavi, Zvi, *Switching and Finite Automata Theory*, ; 3rd edition, Cambridge University Press, 2009
4. Roth,Charles H., *Fundamentals of Logic Design*, 5thEdition, Cengage Learning, 2004
5. Taub, H and D.Schilling, *Digital Integrated Electronics*, McGraw Hill, New York, 1977

Web References:

1.http://nptel.ac.in/courses/117106086/1
2. http://www.nptelvideos.in/2012/12/digital-systems-design.html
3. http://www.nptelvideos.in/2012/12/digital-circuits-and-systems.html
4. http://nptel.ac.in/courses/117105080/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

SIGNALS AND SYSTEMS (SAS)

III Semester :B.TechECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EC203	PC	3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the analysis and classification of signals and systems, analyze frequency domain description of periodic signals

CO2: Analyze frequency domain description of aperiodic signals, understand the characteristics of LTI system and discretization of analog signals

CO3: Apply the concepts of convolution to find the response of the system and find the degree of similarity of two signals using correlation

CO4: Understand the s-domain representation of continuous time signals ands ystems using Laplace Transforms

CO5: Analyze the discrete time signals in z-domain and perform transform analysis of LTI systems using Z-Transform

UNIT - I

Introduction

Basic continuous and discrete time signals, Classification of Signals, Basic operations on signals, Elementary signals, Singularity functions: Impulse, Step and Ramp functions, Classification of continuous time systems and discrete time systems and their properties.

Fourier series

Dirichlet‘s conditions, Trigonometric Fourier series and Exponential Fourier series, Spectrum and its significance, Amplitude and Phase spectra

UNIT - II

Fourier Transforms and Lineartime invariant (LTI) system

Fourier transform(FT), Fourier transform of standard signals, properties of Fourier transforms, Fourier transforms involving impulse function, Fourier transform of periodic signals, Transmission of signals through continuous and discrete time LTI systems, Transfer function of an LTI system, Distortion less transmission through LTI system, Causality & stability

Sampling of continuous time signals

Sampling theorem, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Practical aspects of sampling, Types of sampling

UNIT – III

Convolution and correlation of signals

Graphical method of convolution, auto correlation and Cross correlation of functions, properties of correlation function, Energy density spectrum, Parseval‘s theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function, Relation between convolution and correlation, Applications of convolution and correlation.

UNIT - IV

Laplace Transforms

Laplace transform (LT), Concept of region of convergence (ROC) for Laplace Transforms, Properties of Laplace Transforms, Laplace Transform of periodic signals, Inverse Laplace transforms, Electric circuit analysis using Laplace Transforms, Analysis of continuous time LTI systems using Laplace Transforms

UNIT – V

Z-Transforms

Review of discrete time signals, Region of Convergence(ROC) and its properties, Constraints on ROC for various classes of signals, properties of Z-Transforms, System function, causality and stability, Inverse Z-Transform, Analysis of discrete time LTI systems using Z-Transforms

Text Books :

1. Simon Haykin, –*Signals and Systems"*, 2nd Edition, Wiley-Eastern,2007
2. Oppenheim A.V and Willsky, –*Signals and Systems"*, 2nd Edition, Pearson Edition.2013
3. Hwei Piao Hsu, –*Schaum"s, Outline of Theory Problems of Signals and Systems"*, McGraw-Hill Professional.2010
4. P. Ramesh Babu, –*Signals & Systems*‖ 4th edition, Scitech Publications India,2011.

Reference Books :

1. Simon Haykin, –*Communication Systems"*, 2nd Edition, Wiley-Eastern.2001
2. B.P.Lathi , –*Communication Systems"*, WileyEastern.
3. Anand Kumar, –*Signals and systems"*,3rdedition, PHI,2013
4. A. Nagoor Kani, –*Signals and Systems: Simplified*‖,McGraw-Hill

Web References:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/
2. https://onlinecourses.nptel.ac.in/noc18_ee02/preview
3. https://www.youtube.com/watch?v=s8rsR_TStaA

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any onequestion.

PROBABILITY THEORY AND STOCHASTIC PROCESSES (PTSP)

III Semester: ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EC 204	PC	3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1. Understand the concept of probability using an appropriate sample space.

CO2. Understand the concept of a random variable and mathematical modeling of random variables.

CO3. Compute statistical Averages on single and multiple random variables.

CO4. Understand the concept of random processes in time domain and frequency domain.

CO5. Determine the channel capacity of information signal source.

UNIT - I

Probability Theory

Probability and axioms of probability, Joint Probability and Conditional Probability Total Probability, Bayes Theorem and Bernoulli‘s trials.

UNIT - II

Random Variables

Definition of a Random variable, Classification of Random variables, Distribution and density functions, - Gaussian, Uniform, Exponential, Binomial, Poisson‘s, Rayleigh, Conditional distributions and density functions.

Joint Distribution Function and its Properties , Joint Density and its Properties, Marginal Distribution and Density Functions , Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem.

UNIT - III

Operations on random variables

Expectation, Moments about the origin, Central Moments, Variance, Skew and Kurtosis, Chebyshev‘s Inequality, Markov Inequality, Characteristic function, Moment Generating function, Transformations of a random variable.

Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Schwartz Inequality, Joint Characteristic Functions, Jointly Gaussian Random Variables& properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT - IV

Random Processes-Temporal Characteristics

Random Process Concept, Classification of Random Processes, Distribution and Density Functions, Stationarity and Statistical Independence. Ensemble Averages, Time Averages, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions.

Random Processes-Spectral Characteristics

Power Density Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT – V

Information Theory

Information, Entropy, Rate of information and information capacity, types of channels, Channel capacity for Binary symmetric channel, Binary erase channel.

Text Books :

1. Peyton Z. Peebles, –*Probability Random variables and Random signal principles"*, 4th Edition,TMH,2009.
2. Athanasius Papoulis and Unni Krishna Pillai, –*Probability, Random variables andstochastic Processes"*, 4th Edition, PHI,2009.
3. Simon Haykin, –*Communication Systems*‖, 2nd Edition, JohnWiley,2009.
4. P Ramesh Babu,—*Probability Theory and Random Processes*‖, McGraw-Hill,2015

Reference Books :

1. Henry Stark and John W.Woods, –*Probability and Random processes with applications to signal Processing"*, 3rdedition, Pearson Education,2009.
2. R.P.Singh and S.D. Sapre,‖*Communication Systems Analog & Digital"*, 2ndedition,TMH-2007.
3. I.J.Nagrath, S.N.Sharan, R.Ranjan, S.Kumar, –*Signals and Systems*‖,2ndEdition, TMH,2015.
4. *Murray R. Spiegel, John J. Schiller, R. Alu Srinivasan, "*Schaum's Outline of Theory and Problemsof Probability and Statistics*", McGraw-Hill,2000*

Web References:

1. http://nptel.ac.in/courses/117103067/
2. http://https://ocw.mit.edu/courses/mathematics/18-445-introduction-to-stochastic-processes-spring-2015/
3. https://mathematics.stanford.edu/research-areas/probability/

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any onequestion

NETWORK ANALYSIS (NA)

III Semester :ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EE210	ES	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Apply basic network reduction techniques for analysis of electrical circuits.

CO2: Understand the concept of network topology, resonance and locus diagrams.

CO3: Understand the fundamentals of single, three phase AC circuits and magnetic circuits.

CO4: Apply Network Theorems for Circuit Analysis.

CO5: Analyze transient response of circuits with dc excitation

UNIT - I

Basic Circuit Analysis

R-L-C Parameters, Kirchhoff's Laws, Loop and Nodal methods of analysis of Networks with dependent and independent voltage and current sources.

Network Reduction Techniques

Series, Parallel and their combinations, star-to-delta, delta-to-star transformation and source transformation.

UNIT - II

Network Topology

Definitions, Graphs, Tree, incident matrix, Basic Cutest and Tie set schedules, Matrices for Planar Networks, Duality and Dual Networks

Resonance

Resonance in series and parallel circuits – bandwidth and Q factor, Half-Power Frequencies, Locus Diagrams for RL, RC and RLC combinations.

UNIT - III

Single phase AC Circuits

RMS, and Average values, Form factor, Concept of impedance, admittance, concept of complex power, real, reactive power and power factor, Steady state analysis of series, parallel and series parallel (RL, RC and RLC) circuits with sinusoidal excitation and phasor diagrams.

Three Phase AC Circuits

Generation of three Phase voltages ,currents and power, phase sequence, Relation between Line & Phase quantities in Star and Delta Connection.

Magnetic Circuits

Concept of mutual inductance in coupled circuits- coefficient of coupling – dot convention.

UNIT - IV

Network Theorems

Super Position, Reciprocity, Thevenin‘s, Norton‘s, Maximum Power Transfer, Miller‘s, Tellegen‘s, and Compensation Theorems for DC and AC excitations.

UNIT - V

Transient Analysis:

Transientanalysis ofRC,RLandRLCCircuits,Circuitswithswitches,stepresponse,2nd orderseries and parallel RLC Circuits. Network Analysis using Laplace transforms techniques, step, impulse and exponential excitation.

Text Books :

1. William H. Hayt, Jack Kemmerly and Steven M. Durbin, "Engineering circuitanalysis", McGraw Hill Company, 8th edition,2013.
2. MNahvi, JosephEdminister and KUmaRao, "Electric Circuits" , (Schaum'sOutline Series), McGraw Hill Company, 5th edition,2010.
3. ChoudharyD.Roy, –Networks & Systems|, New Age International Publishers,2nd edition 2010.
4. M E Van Valkenburg, –Network Analysis|, Prentice-Hall of India Pvt Ltd, NewDelhi.

Reference Books :

1. Raymond A.Decarlo and Pen-Min-Lin, "Linear circuit analysis" (time domain phasorand Laplace transform approaches)- 2nd edition, Oxford University Press,2004.
2. N.C.Jagan&C.Lakshminarayana, "Network Theory" B.S. Publications, 3rd edition,2017.
3. Sudhakar, Shyam Mohan Palli, "Network Theory", 2nd edition,TMH.

Web References:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/
2. http://nptel.ac.in/courses/108102042/
3. https://lecturenotes.in/subject/553/electrical-circuit-ec

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any onequestion

CONSTITUTION OF INDIA (CI)

III Semester :CSE and ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
ML202	Mandatory	2	0	0	-	-	-	Audit Course
Sessional Exam Duration : 2 Hrs								

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the formation and principles of Indian Constitution.

CO2: Understand structure and functions of Union government and State executive. Duties of President, Vice president, Prime Minister, Governor, Chief Minister cabinet and State legislature.

CO3: Understand constitutional amendments of 42, 44,74,76,86 and 91. Central-State relations, President rule.

CO4: Understand Indian social structure and languages in India. Rights of women, SC, ST and then weaker section.

CO5: Understand the structure of Judiciary, Role and functions of Supreme Court, High court and Subordinate courts, Judicial review.

UNIT - I

Historical back ground,Significance of Constitution, Making of the constitution, Role of the constituent Assembly, Salient features, the Preamble, Citizenship, procedure for amendment of Constitution Fundamental rights-Derivative principles of state policy-Elections in India.

UNIT - II

Union Executive:Structures of Union Government & Functions, President, Vice President, Prime Minister, Cabinet, Parliament- State Executive:Structures and Functions, Governor, Chief Minister, Cabinet, State Legislature

UNIT - III

Central, State Relations, President‘s Rule, Constitutional Amendments [42, 44, 74, 76, 86 & 91]-Constitutional functionaries, Working of Parliamentary system in India

UNIT - IV

Indian Social Structure, Languages in India-Political Parties & Pressure groups, Rights of Women-S.C‟s, S.T‟s & other weaker sections.

UNIT - V

Judiciary: Structure, Organisation of Judiciary, independence of the Judiciary, role and functions of Supreme Court, High Courts & Sub ordinate courts
Judicial Review.

Text Books :

1. Durga Das Basu, *“Introduction to the Constitution of India”*, Wedwe& Company
2. Macivel, Page, –An Introduction Analysis|, Society
3. M.V. Pylee, *“Indian Constitution”*, S. Chand Publications
4. Subhash C Kashyao :*“Our Constitution”*,NationalBank,Trust, India.
5. Constitutional Law of india by Dr.S.M.Rajan

Reference Books :
1. The Constitution of India.By the Ministry of Law and Justice, The Govt. of India.
2. Constitutional Law of India by kashyapsubhasah,c 3. Indian constitution Law byM.P.Jain
4. Constitutional Law of India by H.M Seervai
Web References:
1. https://www.india.gov.in/my-government/constitution-india

EC204: ELECTRONIC DEVICES & CIRCUITS LAB (EDC (P))

III Semester: ECE					Scheme : 2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EC205	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
End Exam Duration:3 Hrs								

Course Outcomes : At the end of the course students will be able to

CO1: Understand the V-I characteristics of PN diode, Zener diode

CO2: Analyse the rectifier circuits with and without filters.

CO3: Design differentiators and Integrators using R,C elements.

CO4: Design and analyse Clippers and Clampers circuits.

CO5: Understand the Characteristics of BJT and MOSFET.

CO6: Study the frequency response of BJT, FET and MOSFETS.

Introduction to Materials and Apparatus (2 lab sessions):

1. Identification, specifications and testing of R, L, C components (colour codes), potentiometers, Bread boards, CDS, PCB.
2. Identification, specifications and testing of active devices: Diodes, BJT, FET, MOSFET, SCR, & UJT
3. Study and operation of Multi-meters, Function generators, Regulated power supplies, CRO & DSO

List of Experiments

1. P-N Junction Diode & Zener Diode Characteristics
2. Rectifiers
   a) To construct half wave, full wave & bridge rectifiers with and without filters - Calculation ofripple factors.
   b) Simulation of rectifiers and trace their output waveforms with and without filters.
3. RC Network as Integrator and differentiator for low, medium and large time constants.
4. Clipper & Clamper circuits using diodes
   (i) To design, construct and observe output of Positive, negative, biased and combinationalclippers
   (ii) To design, construct and observe output of i. Positive, negative and biasedclampers
5. Common Base input-output Characteristics- α, β and γ calculations
6. Common Emitter input-output Characteristics- α, β and γ calculations
7. FET & MOSFET Characteristics.
8. BiasingCircuits
   a. To design, construct and test different biasing circuits using BJTs, FETs &MOSFETs.
   b. To simulate the biasing circuits and obtain the Qpoint.
9. Common EmitterAmplifier
   a. To design, construct and obtain frequency response of thecircuit.
   b. To measure signal handling capacity, input and outputimpedance.
   c. Compare performance practically and throughsimulation.
   d. Calculation of voltage gain at particularfrequency.

10. Emitter follower
a. To design, construct and obtain frequency response of thecircuit
b. To measure signal handling capacity, input and outputimpedance
c. Compare practical and simulatedresults

BASIC SIMULATIONS LAB (BS (P))

III Semester : ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EC206	PC	0	0	2	1	50	50	100
							End Exam Duration: 3 Hrs	

Course Outcomes : At the end of the course students will be able to,

CO1: Generate basic signals and Perform basic operation on signals.

CO2: Understand the difference between convolution and correlation of the signals.

CO3: Apply Fourier and Laplace transforms on the signals.

CO4: Compute the response of LTI system for unit impulse, step and sinusoidal signals.

CO5: Test the linearity and time variance properties of LTI systems and apply autocorrelation to remove noise in the signals.

List Of Experiments

Note : At least 12 of the following experiments shall be conducted

1. Operations On Matrices.
2. Generation Of Basic Signals.
3. Operations On Signals.
4. Even And Odd Parts Of A Signal.
5. Convolution Of Signals.
6. Auto Correlation And Cross Correlation Of Signals.
7. Verification Of Sampling Theorem.
8. Fourier Transform Of A Signal.
9. Laplace Transform Of A Signal.
10. Computation Of Unit Sample, Unit Step And Sinusoidal Response Of The given Lti System And Verifying Its Physical Realizability and Stability Properties.
11. Demonstration Of Gibbs Phenomenon.
12. Verification Of Linearity And Time Invariance Properties.
13. Removal Of Noise By Autocorrelation.
14. Verification Of Wiener-Khintchine Relations.

ADVANCED COMMUNICATION SKILLS LAB (ACSP)

III Semester :Common for all Branches					Scheme : 2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
HU203	Foundation	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	100	0	100

End Exam Duration: 3 Hrs

Course Outcomes : At the end of the course students will be able to

CO1: Speak in English confidently, fluently and effectively.

CO2: Exhibit team playing and leadership skills.

CO3: Give Presentations effectively.

CO4: Comprehend the Verbal and Non-verbal texts.

CO5: Prepare Resume, Company profiles and Project presentations.

CO6: Enhance possibilities of Job prospects.

List of Experiments

Focus in the lab is more on fluency than on accuracy

1. Ice breaking Activities
2. JAM
3. Listening Comprehension – Practice tests
4. Oral Presentation
5. Presentation Strategies
6. Group Discussion – Team Playing, Leadership Skills
7. Debate
8. PPT‘s – Principles and Formats
9. Information Transfer – Verbal to Non-verbal and Vice-Versa
10. Resume Preparation
11. Company Profiling
12. Interview Skills – a) Telephonic Interview
    b) Personal Interview
13. Project Presentation

Reference Books :

1. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University Press.
2. English Language Laboratories A Comprehensive Manual, Nira Konar, PHI.
3. Technical Communication 3 E, Raman and Sharma, Oxford University Press.
4. Personality Development and Soft Skills, Barun k. Mitra, Oxford University Press.

ANALOG ELECTRONIC CIRCUITS (AEC)

<table>
<tr><td colspan="5">IV Semester: Common to ECE&EEE</td><td colspan="4">Scheme : 2017</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">EC 207</td><td rowspan="2">PC</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration:2 Hrs</td><td colspan="4">End Exam Duration: 3Hrs</td></tr>
<tr><td colspan="9">Course Outcomes: At the end of the course students will be able to</td></tr>
<tr><td colspan="9">CO1:Understand the transistor at high frequencies.</td></tr>
<tr><td colspan="9">CO2: Analyze Negative feedback amplifiers circuits</td></tr>
<tr><td colspan="9">CO3: Design Oscillators circuits.</td></tr>
<tr><td colspan="9">CO4: Analyze large signal amplifier circuits</td></tr>
<tr><td colspan="9">CO5: Analyze Tuned amplifier circuits.</td></tr>
<tr><td colspan="9"></td></tr>
<tr><td colspan="9">UNIT-I</td></tr>
<tr><td colspan="9">Transistor At High Frequencies:
Hybrid-π model, Hybrid-π conductances and capacitances CE short circuit current gain Parameters and f_T, Current gain with resistive load, Single stage CE transistor amplifier frequency response, Gain-bandwidth product (GBW), Bandwidth of cascaded amplifierstages. Analysis of CS and CD JFET amplifiers at high frequencies.</td></tr>
<tr><td colspan="9">UNIT-II</td></tr>
<tr><td colspan="9">Feedback Amplifiers:
Classification of amplifiers, Concepts of feedback, Classification of feedback amplifiers- General characteristics of negative feedback amplifiers- Effect of Negative feedback on Amplifier characteristics. Analysis of Feedback amplifier using Voltage series, Voltage shunt, Current series and Current shunt feedback. Simpleproblems.</td></tr>
<tr><td colspan="9">UNIT-III</td></tr>
<tr><td colspan="9">Oscillators:
Condition for oscillations, Barkhausen criterion, RC Oscillators: RC Phase shift oscillator using FET & BJT, Wien bridge oscillator, LC Oscillators: General form of LC oscillator circuit, Hartley and Colpitts oscillators, and Crystal oscillator.</td></tr>
<tr><td colspan="9">UNIT-IV</td></tr>
<tr><td colspan="9">Large Signal Amplifiers:
Classes of operation, Class A amplifiers (Series fed, Transformer coupled, Push pull), Second Harmonic distortion, Class B amplifiers (Push pull, Complementary symmetry), Crossover distortion and Class AB operation, Class C amplifiers and efficiency. Transistor power dissipation, Heat sinks.</td></tr>
<tr><td colspan="9">UNIT-V</td></tr>
<tr><td colspan="9">Tuned Amplifiers:
Need of tuned amplifiers, Q-factor, Analysis of single stage capacitive coupled, Effect of cascading on bandwidth of single tuned amplifies, Double Tuned amplifiers, Effect of cascading on bandwidth of double tuned amplifies, Stability of Tuned amplifiers.</td></tr>
</table>

Text Books:

1. Millman and Halkias, Integrated Electronics, 2nd Edition, TMH 2010.
2. llen Mottershed, Electronic Devices and Circuits, 28th Edition, PHI 2006.
3. Donald A.Neamen, Eletcronic Circuit Analysis and Design, 2nd Edition, Mc Graw Hill 2001.
4. G. K. Mithal , Electronic Devices and Circuits, 23rd Edition, Khanna pub. 2006
5. David A.Bell, Solid state Pulse Circuits, 4th Edition, 2002 PHI

Reference Books:

1. Bogart Theodore, Electronic Devices and Circuits, 6th Edition, PE 2008.
2. Millman and Grabel, Microelectronic, 2nd Edition, TMH 2003.
3. Henry Zanger, Semiconductor Devices and Circuits, Johnwiley 1984.
4. Sedra and Smith: Microelectronics Circuits, 4/e, Oxford University Press- 1998.
5. Milliman and Taub, Pulse, Digital and Switching Waveforms, McGraw Hill.

Web References:

https://www.electronics-tutorials.ws

w*ww.informationvine.com*

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question paper contains Six questions; question 1 contains 5 short answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is fromone unit and may contain sub-questions .i.e. there will be two questions from each unit and the student should answer any onequestion.

COMPLEX VARIABLES AND SPECIAL FUNCTIONS (CVSF)

IV Semester : Common to ECE&EEE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
BS203	Foundation	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand continuity and analyticity of various complex valued functions.

CO2: Find the Taylor's and Laurent's series expansion of complex functions and evaluate definite real integrals using residues theorem.

CO3: Explain the various properties of the Bessel's and Legendre functions.

CO4: Compute interpolating polynomial for the given data

CO5: Solve ordinary differential equations using numerical techniques

UNIT – I

Complex Variables: Analytic functions, Cauchy-Riemann equations, sufficient conditionfor analyticity, Harmonic function, Method to find the Conjugate function, Milne – Thomson method. Conformal Mapping (e^z , z^2 , sinz, cosz) , Bilinear Transformation.

UNIT - II

Complex Integration & Series : Simple and Multiple Connected regions, Cauchy's Integral theorem, Cauchy's integral formula, Generalized Integral formula. Taylor's series, Maclaurin's series and Laurent's series. Residue theorem, Method of finding residues. Evaluation of real integrals by contour integration, Integration round the unit circle and in the interval $(-\infty, \infty)$.

UNIT – III

Bessel Functions : Solution of Bessel's equation, Recurrence relations for Jn(x), Generating function, Jacobi series, Orthogonality of Bessel's function.

Legendre Functions: Solution of Legendre's equation, Rodrigue's formula, Legendre polynomials, Generating function, Recurrence relations for Pn(x) and Orthogonality of Legendre polynomials.

UNIT - IV

Interpolation : Operators, relation between the operators. Newton's forward and backward interpolation formulae. Lagrange's and Inverse Lagrange's interpolation formulae. CubicSpline interpolation.

UNIT - V

Numerical Methods: Solution of first order Differential equations. Taylor's method, Picard's method, Euler's and Modified Euler's methods. Runge-Kutta methods of second and forth order. Predictor - Corrector methods- Milne's method and Adam's method.

Text Books

1. B.S.Grewal [2012], Higher Engineering Mathematics, Khanna Publishers,NewDelhi

2. K.V Iyengar and others [2013], Engineering Mathematics Vol-3, S.Chand & Co. New Delhi

Reference Books
1. S.S.Sastry, –Introductory Methods of Numerical Analysis|, PHI, 2010
2. Erwin Kreyszig –Advanced Engineering Mathematics|, John Wiley and Sons 8th Edition,2008

Question Paper Pattern:

InternalAssessment: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

EndExam: Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any one question

ELECTROMAGNETIC WAVES (EMW)

IV Semester :ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EC208	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the principles of vector algebra, vector calculus and their physical interpretations in electromagnetic fields

CO2: Analyze Gauss's law and its applications

CO3: Apply concepts and principles of electrostatic fields to solve complex problems

CO4: Analyze Biot-savart's law and Ampere's law to determine magnetic field intensity

CO5: Analyze Maxwell's equations for time varying electromagnetic fields and understand the formation and characteristics of electromagnetic wave

UNIT - I

Co-ordinate Systems and Vector Calculus

Vector Algebra, Co-ordinate systems-Cartesian, Cylindrical and Spherical, Transformation of Vector functions from one Co-ordinate system to another. Gradient, Divergence, Curl and their physical interpretations, Stokes theorem, Divergence theorem.

UNIT - II

Electro Static Fields-I

Coulomb's law, Electric field intensity, Field due to different charge distributions-Line charge, Sheet charge and Volume charge distributions. Electric flux and Flux density, Gauss's law and its application. Maxwell's first equation in integral and point forms.

UNIT – III

Electro static field-II

Energy expended in moving a point charge in an electric field, Line integral, Potential difference and Potential, Potential field of a point charge and system of charges, Potential gradient, Dipole, Energy density in the electrostatic field. Current and current density, Continuity equation and Relaxation time, Metallic conductors, Nature of dielectric materials, Boundary Conditions for perfect dielectrics and conductors, Capacitance, Poisson's and Laplaceequations-examples.

UNIT - IV

Magneto static Fields

Biot-Savart's law, Ampere's circuital law, Magnetic flux and magnetic flux density, scalar and vector magnetic potentials, Force on a moving charge, Differential current element and force between two differential current elements, force and torque on closed circuit, Magnetization and permeability, Magnetic boundary conditions, Energy stored in a magnetic field, Energy density.

UNIT – V

Time Varying Fields & Maxwell's Equations

Faraday's law, Lorentz Force Equation, Maxwell's equations in various forms, Displacement Current Density.

Uniform Plane Wave

Electromagnetic wave propagation media, Wave motion in free space, perfect and lossless dielectrics, lossy dielectrics and good conductors, skin depth, Surface impedance, Poynting theorem, Polarization, Reflection of plane waves- Normal Incidence and obliqueincidence (Perpendicular and Parallel Polarizations)

Text Books :

1. Hayt.W.H, *Engineering Electromagentics*, 7th Edition,TMH.
2. Sadiku, *Engineering Electromagnetics*, 3rd Edition, Oxford UniversityPress.
3. G.S.N.Raju, EM *Field Theory and Transmission Lines*, 1st Edition, PearsonEd.

Reference Books :

1. Jordan and Balmain, *EM Waves and Radiating Systems*, 2nd edition, PearsonEd.
2. John.D.Kraus, *Electromagnetics*, 6th Edition, McGraw-Hill.
3. Nanapeneni Narayana Rao, *Elements of Engg. Electromagnetics*, 6th Edition, PearsonEd.

Web References:

1. https://ocw.mit.edu/resources/res-6-001-electromagnetic-fields-and-energy-spring-2008/
2. https://www.youtube.com/playlist?list=PL4BE7BAFFAB78FC44
3. https://www.youtube.com/watch?v=CZWK0tCrX6k

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any onequestion.

NETWORKS AND TRANSMISSION LINES (NTL)

IV Semester :ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EC209	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the characteristics of two port networks – Z, Y, h, g and ABCD parameters.

CO2: Understand the characteristics of symmetrical and asymmetrical networks.

CO3: Design filters, attenuators and equalizers.

CO4: Understand the signal behaviour through a transmission line.

CO5: Analyse the reflection coefficient, standing wave ratio, input impedance and the location of maxima and minima of a transmission line at UHF.

CO6: Design single stub network and double-stub network for matching load impedances using Smith Chart.

UNIT - I

Two Port Networks

Driving point and transfer functions, Two port network parameters, Z, Y, ABCD, h and g parameters, Relationship between parameter sets, Interconnection of Two port networks, Analysis of Reciprocal networks.

Characteristics of Networks

Standard T, Π, L sections and Lattice networks. Characteristic impedance and propagation constant. Image and iterative impedances, Image transfer constant& iterative transfer constant.

UNIT - II

Filters

Filter fundamentals: The Decibel and Neper, Types of Filters, Characteristics of the filter, Constant K filters: Low pass, High pass, Band pass, Band stop filters design. m-derived filters: m-derived low pass, high pass filters and Compositefilters.

Attenuators:

Symmetrical T-type attenuator, L-type attenuator and Π - type attenuators.

Equalizers:

Series and shunt equalizers, T- Type equalizer and L-type equalizer.

UNIT - III

Transmission Line Theory

Types of transmission lines, Primary constants, Skin effect, Transmission line equations from source and load end, Infinite line, Secondary constants, Velocity of propagation, Group velocity. Terminations: Open and short circuited lines, Line distortion, Distortion less line, loading and types of loading.

UNIT - IV

RF Lines

Properties of transmission lines at UHF, Reflection coefficient, Standing waves, Characteristics of half wave, Quarter wave and 1/8 wave lines.

UNIT - V

Smith Chart

Construction and applications of Smith chart, Transmission line matching. Single and double stub matching.

Text Books :

1. Van Valkunberg, Network Analysis (Unit-I).3rdEdition, PHI 1974.
2. UmeshSinha, Networks and Transmission Lines, 8thEdition,SatyaPrakashan

Reference Books :

1. John D Ryder, Networks Lines and Fields, 2nd Edition, Prentice Hall2003.
2. Johnson, Transmission Lines and Networks,TMH.
3. V K AAtre, Network Theory & Filter Design, New AgeInternational.
4. A.Sudhakar and S.P.Shyam Mohan, Circuits and Networks, 3rd Edition, TMH2007

Web References:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-763-applied-superconductivity-fall-2005/lecture-notes/lecture7.pdf
2. nptel.ac.in/courses/117101056/

Question Paper Pattern:

Sessional Exam

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End Exam

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COMPUTER ORGANIZATION & ARCHITECTURE (COA)

IV Semester:**ECE**								Scheme:**2017**
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EC210	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
		3	**0**	**0**	**3**	**40**	**60**	**100**
SessionalExamDuration:2Hrs							**EndExamDuration:3Hrs**	

Course outcomes: After the completion of the course the student will be able to:

CO1: Understand the concepts of Basic Computer organization and its design.

CO2: Analyze the concepts of CPU and its Addressing modes.

CO3: Apply the concept of Computer Arithmetic.

CO4: Understand the concepts of I/O and Memory organization.

CO5: Analyze the importance of Pipeline and Vector Processing.

Unit – I

Register Transfer and Micro-Operations:
Register transfer, Bus and Memory transfers, Arithmetic, Logic and Shift micro-operations, Arithmetic logic shift unit.

Unit – II

Basic Computer Organization and Design:
Instruction codes, Computer registers, Computer instructions, timing and control, Instruction cycle, Memory reference instructions, Input /output and Interrupt, Design of basic computer.

Unit – III

Central Processing Unit:
General register organization, Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control.

Computer Arithmetic:
Algorithms for fixed point and signed 2‘s complement binary arithmetic operations, Floating point arithmetic operations.

Unit – IV

Input / Output Organization:
Peripheral devices, Input/Output interface, Asynchronous data transfer, Modes of transfer, Priority interrupt, DMA.

Memory Organization:
Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory.

Unit – V

Pipeline and Vector Processing:
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC pipeline, Vector processing, Array Processing.

Text Books:

1. M.Morris Mano, Computer System Architecture, PHI, 3/e, 2007.
2. William Stallings ,Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy,2010

Reference Books:

1.John P.Hayes, *Computer Architecture and Organization*, McGraw Hill, 3/e, 1998

2. Hemachar, Computer Organization, Mc Graw Hill, 5/e, 2002.

3.K.Hwang&F.A.Briggs,ComputerArchitectureandParallelProcessing,McGrawHill,Indian Edition, 2013.

Question paper pattern:

Sessional Exam

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End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions.

i.e there will be two questions from each unit and the student should answer any one question.

ELECTRICAL TECHNOLOGY (ET)

IV Semester :ECE					Scheme : 2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EE211	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		2	0	0	2	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the constructional aspects and analyze the operation, working and performance characteristics of various dc machines.

CO2: Understand and analyze the performance characteristics of various transformers.

CO3: Understand the constructional aspects and analyze the operation, working and performance characteristics of different types of induction motors.

CO4: Understand constructional aspects and analyze the working, operation and the performance characteristics of different synchronous machines. Select a proper electrical machine for various applications.

UNIT - I

D.C. Generators

Constructional features-single lap and wave windings-EMF equation-methods of excitation-characteristics of shunt, series and compound generators.

UNIT - II

D.C. Motors

Principle of operation —torque equation- speed-torque characteristics of shunt, series and compound Motors – Losses and efficiency–testing– Swinburne‟s test and brake test.

UNIT - III

Transformers

Principle of operation –constructional features-EMF equation- Equivalent circuit- phasor diagram on No Load and Load.

Performance of Transformers

Losses and Efficiency of transformer and Regulation – OC and SC tests.

UNIT - IV

Alternators

Constructional features – A.C Windings-Pitch factor and Distribution factor- EMF equation - concept of synchronous reactance-vector diagram- regulation –determination by Synchronous Impedance Method – Conditions for synchronizing.

Synchronous Motors

Principle of operation- methods of starting, applications.

UNIT - V

Poly Phase Induction Motors

Constructional features -Principle of operation– Slip-Torque characteristics – Losses and Efficiency-.Methods of Speed control-Star-delta and rotor rheostat starters-applications.

Single Phase Induction Motors

Construction- Characteristics –starting split phase and shaded pole methods.

Text Books :

6. M.S Naidu and S. Kamakshaiah, Introduction to Electrical Engineering, TMH Publications.
7. T.K. Nagasarkar and M.S.Sukhija, Basic Electrical Engineering, Oxford University Press, 2005

Reference Books :

1. V.K Mehta, Principles of Electrical Engineering, S.Chand Publications.
2. I.J. Nagarath amd D.P Kothari, Theory and Problems of basic electrical engineering, PHI Publications.
3. P.S. Bibmra, Electrical Machineray, khanna publisher.

Web References:

1. http://nptel.ac.in/courses/108108076/
2. http://www.nptelvideos.com/electrical_engineering/basic_electrical_technology_iit_ lectutes.php
3. http://www.nptelvideos.in/2012/11/electrical-machines-i.html.

Question Paper Pattern:

Sessional Exam

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End Exam

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ENVIRONMENTAL STUDIES(ES)

IV Semester: Common for CSE & ECE						**Scheme : 2017**		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
ML201	**Mandatory**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
		2	**0**	**0**	**-**	**-**	**-**	**Audit Course**
Sessional Exam Duration :-					**End Exam Duration:-**			

Course Outcomes : At the end of the course students will be able to

CO1: Apply the knowledge of environmental issues in his area of work. Appreciate the need for the conservation of Natural resources for sustainable development.

CO2: Understands the importance of Ecosystem and conservation of biodiversity

CO3: Understands the problems due to environmental pollution with remedial measures and issues related to environment.

CO4: Appreciate the disaster management in prevention of loss of life and property

CO5: Appreciate the use of IT & related technology to conserve environment & human health.

UNIT - I

Introduction to Environmental studies and Natural resources

Definition, scope, importance and multidisciplinary nature of Environmental studies. Need for public awareness.

Energy resources-Growing energy needs nonrenewable and renewable energy resources: Hydroelectric, solar, wind and nuclear energy resources. Water resources-Use and over exploitation of surface and ground water. Dams and its effects on forest and tribal people. Forest resources- uses of forest, deforestation causes and effects. Food resources- changes causedby agricultureandovergrazing. Modernagricultureanditseffects. Roleofindividualinconservation of naturalresources.

UNIT - II

Concepts of ecosystem

Structure and function of an ecosystem. Energy flow in an ecosystem (single channel energy flow model). Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features and functions of grasslands, desert, pond and ocean ecosystems.

UNIT - III

Biodiversity and its conservation

Definition, levels of biodiversity. Values of biodiversity- consumptive, productive, social, ethical and ecological services. Hot spots of biodiversity. Biogeographical classification of India. Endangered and endemic species of India. Threats to biodiversity-Habitat loss, poaching of wild life and man-wild life conflict. Conservation strategies- In situ and ex situ conservation.

UNIT - IV

Environmental pollution

Definition, causes, effects and control measures of air, soil,water and noise pollution. Disaster management- Floods. Earth quake, cyclone and landslides. Global warming, acid rains, ozone layer depletion. Waste management-Municipal solid waste. Role of an -individual in prevention of pollution.

UNIT - V
Social issues and the environment Consumerism and waste products. From unsustainable development to sustainable development. Salient features of Air Act, water Act and Forest conservation Act. Process involved in the enforcement of environmental legislation. Role of Information Technology in environment and human health.
Text books
1. C.P. Kaushik and Anubha Kaushik, ― Environmental Studies‖ New Age International(p) Ltd., New Delhi
2. R.Rajagopalan ― Environmental Studies‖, Oxford University press, Chennai
3. Y.Anjaneyulu ― Introduction to Environmental sciences‖, BS Publications, Hyderabad
Reference books
1. Benny Joseph. ‒Environmental Studies‖ , Tata McGraw Hill, New Delhi.
2. Barucha Erach, ‒Environmental studies‖, Universities press.

ANALOG ELECTRONIC CIRCUITS LAB (AEC (P))

IV Semester: ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EC211	PC	0	0	2	1	50	50	100

End Exam Duration: 2 Hrs

Course Outcomes : At the end of the course students will be able to

CO1: Study the FET and MOSFET amplifier characteristics.

CO2: Analyse the effect of feedback on amplifier characteristics

CO3: Analyse the effect of Negative and Positive feedback on amplifiers

CO4: Determine the efficiency of Class A Power amplifier and Class B Complementary Symmetry Power amplifier

CO5: Design and analyse two stage RC coupled amplifier, Darlington, Bootstrap and Cascode amplifiers.

CO6: Design single Tuned amplifier and verify its frequency response..

Design and Simulation using simulation Software (tina-pro/multisim) and testing in Laboratory. (12Experimentsincludingsimulationof6experimentsandtestingof6experimentsin Laboratory)

List of Experiments

1. FETamplifier
a. To design, construct and obtain frequency response of the JFET amplifiercircuits
b. To measure signal handling capacity, input and outputimpedance

c. Compare performance practically and throughsimulation

2. MOSFETamplifier
a. To design, construct and obtain frequency response of the MOSFET amplifiercircuits
b. To measure signal handling capacity, input and outputimpedance
c. Compare performance practically and throughsimulation

3. Negative feedbackamplifier
a. To design, construct and test response of i. voltage shunt ii. voltage series feedback amplifiers with and without feedback for the givenspecifications

b. To compare their frequency response throughsimulation

4. RCoscillators
To design, construct and test the
a. RC Phase shift oscillator b. Wien bridge oscillator for the givenspecifications

5. Hartley and Colpitts oscillators
To design, construct and test the a. Hartley oscillator

b. Colpitts oscillator for the given specifications

6. Class B complementary symmetry amplifier

To obtain the frequency Vs power and load Vs power characteristics

7. Class C power amplifier To obtain the frequency Vs power and load Vs power characteristics
8. CascadeAmplifier a. To design, construct and obtain frequency response of a two stage RC coupledamplifier b. To measure signal handling capacity, input and outputimpedance c. Compare performance practically and throughsimulation
9. Darlington pair To design, construct and obtain frequency response practically and through simulation
10. Bootstrap Amplifier To design, construct and obtain frequency response practically and through simulation
11. Cascode amplifiers To design, construct and obtain frequency response practically and through simulation
12. Single Tuned Amplifier To design, construct and obtain frequency response practically and through simulation

ELECTRICAL CIRCUITS AND MACHINES LAB (ECM(P))

IV Semester : ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EE212	PC	0	0	2	1	50	50	100

End Exam Duration: 2 Hrs

Course Outcomes : At the end of the course students will be able to

CO1: Determine load regulation characteristics of generators and Motor.

CO2: Understand regulation characteristics of 1-phase transformer and Alternators.

CO3: Apply Kirchhoff laws

CO4: Understand network theorems.

List of Experiments

Note : At least 8 of the following experiments shall be conducted

1. Load test on DC Compound Generator.
2. Swinburne‘s Test.
3. Brake Test on Three Phase Squirrel cage Induction Motor.
4. Regulation of Alternator.
5. Load Test on Single Phase Transformer.
6. OC and SC test on Single Phase Transformer.
7. Brake Test on DC Shunt Motor.
8. Determination of self-inductance, Mutual inductance and coefficient of coupling.
9. KCL and KVL.
10. Thevenin‘s Theorem.
11. Norton‘s Theorem.
12. Superposition Theorem.
13. Locus diagrams on RL &RC circuits.

SOFT SKILLS LAB (SSP)

IV Semester :Common for all Branches					Scheme : 2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
HU204	Foundation	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	100	0	100

Course Outcomes : At the end of the course students will be able to

CO1: Communicate effectively and enhance their interpersonal relationship building skills with renewed self confidence

CO2: Work together in teams and accomplish objectives in a cordial atmosphere

CO3: Face interviews, GDs and give presentations

CO4: Understand and develop the etiquette necessary to present themselves in a professional setting

CO5: Learn the Principles of Personal effectiveness

List of Experiments

1. Ice breaking Activities, Principles of Time and Stress Management
2. Art of speaking -1 (Prepared)
3. Art of speaking -2 (Extempore)
4. Art of writing - Essay / Picture / Story
5. Business etiquette - Telephone and email
6. Presentation Skills - Power point making
7. Group Discussion – Objectives and Skills tested in a GD, types of GD, Dos and don'ts
8. Group Discussion - Practice
9. Team work - Drama / Skit / Role play
10. Paper / Poster Presentation
11. Problem Solving by lateral thinking puzzles
12. Know your General Awareness / Knowledge - Quiz
13. Principles of Personal excellence

Reference Books :

1. Stephen R. Covey, –The Seven Habits of Highly Effective People‖, Pocket Books Publishers, London
2. Priyadarshani Patnaik, –Group Discussion and Interview Skills with VCD‖, Foundation Books.
3. Sangeeta Sharma & Binod Mishra, –Communication Skills for Engineers and Scientists‖, PHI Learning Private Limited.
4. Shiv Khera, –You Can Win‖, MacMillan India Publishers, New Delhi
5. Campus Connect Portals - TCS - https://campuscommune.tcs.com; Infosys - http://campusconnect.infosys.com/

ANALOG AND DIGITAL COMMUNICATIONS (ADCM)

V Semester : B.Tech ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EC301	PC	3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand different amplitude, angle modulation and demodulation schemes.

CO2: Evaluate the Figure of merit of various AM and FM schemes.

CO3: Understand various pulse modulation and demodulation schemes.

CO4: Analyze various methods of base band data transmission and detection methods.

CO5: Evaluate the probability of error and power for various coherent and digital modulation techniques.

UNIT – I

Amplitude and Angle modulation and demodulation:

Block diagram of general communication system, Need for Modulation, Generation and demodulation of AM, Band width, Power relations, Generation and demodulation of DSBSC and SSB, Frequency Modulation and Phase Modulation, FM narrow band and wide band techniques, Generation of FM, Demodulation of FM- Frequency discrimination method, Introduction to PAM,PWM and PPM schemes.

UNIT – II

Noise

Various types of noise, Equivalent noise band width, Noise figure, Noise temperature.
Super heterodyne receiver and its parameters, Concept of image frequency.

Noise in AM and FM

Noise in AM and FM, Figure of merit of AM, DSBSC and FM, Threshold effect, Pre-emphasis and De-emphasis circuits.

UNIT – III

Pulse Code Modulation

Elements of PCM, Quantization (Uniform and Non-uniform), Companding, Band width, Noise in PCM systems, Transmitters and receivers of Differential Pulse code modulation (DPCM), Delta Modulation (DM), Adaptive Delta modulation (ADM).

UNIT – IV

Baseband Data Transmission

Elements of Digital communication system, Baseband PAM, Nyquist criterion for zero ISI, Raised cosine pulse shaping, Duo-binary PAM systems, M-ary signaling schemes, Eye diagram.

UNIT – V

Digital modulation and demodulation techniques :

Optimum receiver, Coherent reception of ASK,FSK and PSK schemes, Correlation Receiver, Matched filter receiver, Determination of Probability of error for coherent ASK,FSK and PSK schemes, Description of QPSK,QAM, Introduction to Non-coherent reception of ASK,FSK and PSK schemes, Comparison of coherent and non-coherent ASK, PSK and PSK schemes.

Text Books :

1. Simon Haykin, *Communication Systems*, 2nd Edition, Wiley Eastern, 2008.

2. K. Sam Shanmugam, *Digital and Analog Communication Systems*, 2nd Edition, Wiley-India, 2008.

Reference Books :

1.Taub, H and D.Schilling, *Principles of communication systems*, 3rd edition, Tata McGraw Hill, 2013

2. R.P.Singh and S.D.Sapre, *Communication systems- Analog & Digital*, 2nd edition, TMH, 2008.

3. B.P.Lathi, *Communication Systems*, 3rd edition, BS publications, 2007.

Web References:

1.https://nptel.ac.in/courses/117105143/

2. http://www.nptelvideos.in/2012/12/digital-communication.html

3. http://www.digimat.in/nptel/courses/video/117105143/L51.html

Question Paper Pattern:

Sessional Exam:

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MICROPROCESSORS AND MICROCONTROLLERS (MPMC)

V Semester :Common for ECE&EEE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC302	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the definition, architecture and special features of 8086 microprocessor

CO2: Apply the programming model of 8086 microprocessor to frame assembly language programs.

CO3: Understand the interfacing concepts of 8086 microprocessor for various peripherals.

CO4: Understand the definition, architecture and working details of 8051 microcontroller

CO 5: Utilize the Programming model and port interfacing concepts of 8051to program variousperipherals.

UNIT – I

Introduction of Microprocessors

8-bit, 16-bit microprocessors. 8086: 8086 CPU architecture, segmented memory, Physical Memory Organization.

UNIT – II

8086 Programming model

Addressing modes, 8086 instruction set, Basic Assembler Directives, Simple programs on Arithmetic operations Sorting, Searching, Code conversions, and String manipulations.

UNIT –III

Peripheral Interfacing

8255 (Programmable Peripheral Interface), 8255 applications – Basic Mode Applications - Stepper Motor interfacing, DAC interfacing Waveform generation and ADC interfacing. Introduction to 8251(USART), 8259 (Programmable Interrupt Controller).

UNIT –IV

Introduction to MCS51 family

8051 Micro controller Architecture, Input / Output ports and circuits, External memory, counters and Timers, Serial data input/output, interrupts.

UNIT-V

Programming and Interfacing

Addressing Modes, Instruction set. Basic Programming with 8051 Micro controller. Interfacing LCD, LEDs, Stepper Motor.

Text Books :

1. A K Ray, K M Bhurchandi, *Advanced Microprocessors and Peripherals*, 2nd Edition, Tata McGraw Hill Education Private Ltd, 2010.
2. Mazidi Muhammad Ali, Mazidi Janice Gillespie & McKinlay Rolin D, *The 8051 Microcontroller and Embedded Systems*, 2nd Edition, Pearson Education, 2008.

Reference Books :

1. John Uffenbeck, *The 8086/8088 Family: Design, Programming, and Interfacing*, 3rd Edition, Pearson Ed, 2006.

2. Barry B. Brey, *The Intel Microprocessors-Architecture, Programming and Interfacing*, 8th Edition, Princeton Hall India, 2009.

3. Kenneth J. Ayala, *The 8051 Microcontroller*, Penram International Publication Ltd, 2006.

4. Gaonkar Ramesh, *Microprocessors Architecture, Programming & Applications with 8085/8080A*, 5th Edition, Penram International publication Ltd, 2010.

5. N. Senthil Kumar, M. Saravanan, S. Jeevananthan, *Microprocessors and Interfacing,* OUP India, 2012.

Web References:

1.www.nptel.onlinecourseac.in/.microprocessorsandmicrocontrollers

2. https://onlinecourses.nptel.ac.in/noc18_ec03/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

INTRODUCTION TO VLSI DESIGN (IVLSID)

V Semester:ECE						Scheme:2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECE303	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: Absorb the ASIC classification and detailed steps followed in modern IC fabrication.

CO2: Derive the MOSFET I-V characteristics from basic understanding of n, p channel devices.

CO3: Analyze the CMOS circuits, their characteristics delays, power and transistor sizing.

CO4: Comprehend other logic variations viz. pass-transistor, dynamic, pseudo NMOS, logic.

CO5: Grasp the semiconductor memories namely RAMs, ROMs, for their feature set.

UNIT-1

VLSI Fabrication Technology*:*

Introduction to ASICs, ASICs classification, Typical ASIC/VLSI Design Flow, IC Fabrication Steps, Art of miniaturization, VLSIProcesses: Twin-Well CMOS Process**,** MOSFET, Resistors, Capacitors, pn junction Diodes, BiCMOS Process, Lateral pnp Transistor, p-Base and Pinched-Base Resistors, VLSI Design Rules, VLSI Layout, Layouts for CMOS Inverter, CMOS NAND and NOR gates, Beyond 20nm Technology- FinFET

UNIT-2

Introduction to MOSFETs:

Introduction,Device Structure and Physical Operation, Current–Voltage Characteristics, MOSFET Circuits at DC, The Body Effect and Other Topics, Comparison of MOSFET and BJT, Summary, Problems

UNIT-3

CMOS Digital Logic Circuits:

Introduction, CMOS Logic-Gate Circuits, Digital Logic Inverters, The CMOS Inverter, Dynamic Operation of the CMOS Inverter, Transistor Sizing, Power Dissipation, Summary, Problems

UNIT-4

Advanced Topics in Digital IC Design:

Introduction, Implications of Technology Scaling in Deep Submicron Designs, Digital IC Technologies, Logic-Circuit Families, Design Methodologies, Pseudo-NMOS Logic Circuits, Pass-Transistor Logic Circuits, Dynamic MOS Logic Circuits, Bipolar and BiCMOS Logic Circuits, Summary, Problems.

UNIT-5

Memory Circuits*:*

Introduction, Latches and Flip-Flops, Semiconductor Memories-Types and Architectures, Random-Access Memory (RAM) Cells, Sense Amplifiers and Address Decoders, Read-Only Memory (ROM), CMOS Image Sensors, Summary, Problems.

Text Books:

1. Adel S. Sedra and Kenneth C. Smith. 2015. *Microelectronic Circuits Revised Edition* (7thed.). Oxford University Press, Inc., New York, NY, USA.
2. Neil Weste and David Harris. 2010. *CMOS VLSI Design: A Circuits and Systems Perspective* (4thed.). Addison-Wesley Publishing Company, USA.

Reference Books:

1. Jan M. Rabaey, AnanthaChandrakasan, and Borivoje Nikolic. 2008. *Digital IntegratedCircuits* (3rded.). Prentice Hall Press, Upper Saddle River, NJ, USA.
2. Michael John Sebastian Smith. 2008. *Application-Specific Integrated Circuits* (1st ed.). Addison-Wesley Professional.
3. Wayne Wolf. 2008. *Modern VLSI Design: Ip-Based Design* (4th ed.). Prentice Hall PTR, Upper Saddle River, NJ, USA.
4. Douglas A. Pucknell and Kamran Eshraghian. 1994. *Basic VLSI Design* (3rd Ed.). Prentice-Hall, Inc., Upper Saddle River, NJ, USA.

Web References:

1.https://nptel.ac.in/courses/117101058/

2. https://www.intel.in/content/www/in/en/company-overview/intel-museum.html

3. http://global.oup.com/us/companion.websites/9780199339136/

4. www.cmosvlsi.com/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

LINEAR IC APPLICATIONS (LICA)

V Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC304	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand basic concepts and characteristics of differential amplifier and opamp using BJT and FET

CO2: Analyze basic application circuits of opamp with negative and positive feedback

CO3: Design various opamp application circuits using special ICs namely 555 timer, IC8038 & IC566, IC565 PLL

CO4: Understand the principle of operation and applications of IC regulators and data converters.

CO5: Understand the specifications and operation of logic families using BJT and MOSFETs.

UNIT – I

Op-Amp Fundamentals:

Differential amplifier: Basic operation, CMRR, DC and AC Analysis of dual input-balanced output and dual input-unbalanced output modes, characteristics.

Op-amp ideal characteristics, Study of typical IC op-amp and its different stages, Practical inverting and non-inverting op-amp

dc characteristics: i/p bias current, i/p offset current, Offset voltages, Offset balance, Thermal drift, ac characteristics: frequency response, stability of op-amp, Frequency compensation, Slew rate, op-amp parameters, Features of 741 op-amp. Brief analysis of opamp using JFET, Introduction to dual OP-AMP TL082 as a general purpose JFET –input operational amplifier: pin configuration and features.

UNIT – II

Op-amp Applications-I *:*

Summing amplifier, Difference amplifier, Current to voltage and voltage to current converters, Instrumentation amplifier, Clippers and clampers, Precision AC to DC converters, Integrator, Differentiator, Log & antilog amplifier, Sample and hold circuits.

Op-amp Applications-II

Comparators and active filters:

Comparators, window detector, Schmitt trigger, Pulse, Square and triangle wave generators, Wein Bridge oscillator, Active filters (Butterworth filters up to second order only).

UNIT – III

Timers & Waveform Generators*:*

555 Timer: Astable and Monostable modes, Applications, waveform generators: IC 566 and IC 8038.

Phase Locked Loops**:**

Principle of operation, Lock and capture ranges, detailed study of different blocks of PLL, IC 565 PLL, and Applications of PLL.

UNIT – IV

IC Regulators*:*

General form of series Regulators, Fixed voltage regulator (78XX, 79XX), IC 723 voltage regulator, switching regulators (SMPS).

D/A and A/D Converters *: DACs* :

Weighted resistor, R-2R ladder type and inverted R-2R ladder, ADCs: Parallel comparator type, Successive approximation and dual slope types, Sigma-Delta ADC, Specifications of converters.

UNIT – V
Logic Families: Specifications of logic gates, DTL, HTL, TTL, ECL, MOS and CMOS circuits, CMOS bilateral switch, Comparison of logic families, TTL driving CMOS and CMOS driving TTL.
Text Books :
1. Roy Choudhury & Shail B.Jain, *Linear Integrated Circuits*, 4/e, New Age Int. Pub. 2010.
2. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, 4/e, PHI, 2003.
3. Moris Mano, *Digital Logic and Computer Design*, Pearson Ed., 2011.
Reference Books :
1. S. Salivahanan, V.S.K. Bhaaskaran, *Linear Integrated Circuits*, TMH, 2008.
2. Anand Kumar, *Pulse and digital Circuits*, PHI, 2/e, 2010.
3. R.P. Jain, *Modern Digital Electronics*, TMH, 3/e, 2003.
Web References:
1. TL082: Data sheet:http://www.ti.com/lit/ds/symlink/tl082.pdf
2. Application note:http://www.ti.com/lit/an/sloa020a/sloa020a.pdf
3. https://www.youtube.com/watch?v=nb11AipMJd4
4.https://www.youtube.com/watch?v=9Rt7iuqSVJ8
Question Paper Pattern:
Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach **End Exam:** Question Paper Contains Six Questions. Question 1 contains 5 short Answer quest ions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

ANALOG AND DIGITAL COMMUNICATION LAB (ADCM(P))

V Semester : B.Tech ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC305	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Analyze various analog modulation and demodulationschemes.

CO2: Understand the spectral characteristics of various analog modulation schemesusing spectrum analyzer.

CO3: Understand various pulse modulation and demodulationschemes.

CO4: Analyze various digital modulation and demodulationtechniques.

CO5: Analyze various analog and digital modulation and demodulationschemes usingMATLAB simulation.

LIST OFEXPERIMENTS

CYCLE – I: Experiments using Communication Trainerkits

1. Demonstration of Amplitude modulationanddemodulation. [CO1]
2. Demonstration of Frequency modulationanddemodulation. [CO1]
3. Demonstration of Frequency Division multiplexingandDe-multiplexing. [CO1]
4. Analysis of Spectrum Analyzer to measure AM andFMspectra. [CO2]
5. Demonstration of Pulse amplitude modulationanddemodulation. [CO3]
6. Demonstration of Pulse width and Pulse position modulationand demodulation. [CO3]
7. Demonstration of ASK modulationanddemodulation. [CO4]
8. Demonstration of FSK modulationanddemodulation. [CO4]

CYCLE – II: Simulation experiments using MATLAB software

9. Simulation of Amplitude modulationanddemodulation. [CO5]
10. Simulation of DSBSC modulationanddemodulation. [CO5]
11. Simulation of Linecodingtechniques. [CO5]
12. Simulation of PSK modulationanddemodulation. [CO5]

ADDITIONAL EXPERIMENTS

13. Demonstration of SSB modulationanddemodulation. [CO1]
14. Demonstration of Delta modulationanddemodulation. [CO4]
15. Simulation of ASK and FSK modulationanddemodulation. [CO5]

MICROPROCESSORS AND MICROCONTROLLERS LAB (MPMC (P))

V Semester : ECE					Scheme : 2017			
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
EC306	PC	0	0	2	1	50	50	100
					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1: Execute 8086 programs using Addressing modes and instruction set on trainer kit

CO2:Utilize environments like Turbo Assembler and debug to execute programs

CO3: Compile programs of 8051 using Keil software and Interface 8086 with peripherals.

CO4: Implement 8051 Microcontroller-interfacing applications on embedded trainer board.

LIST OF EXPERIMENTS

CYCLE – I: Introduction to Assembly Language Programs Using 8086 Kits

(8086 RELATED PROGRAMS)

1. Execute the 8086 assembly language programs onarithmeticoperations. [CO 1]
2. Execute the 8086 assembly language programs on series ofdataoperations. [CO 1]
3. i) Execute the 8086 assembly language programs on factorial ofa number [CO 1]
   ii) Execute the 8086 assembly language programs on Fibonacci series generation
4. Execute the 8086 assembly language programs usingDebugEnvironment [CO2]
5. Execute the 8086 TASM ProgrammingUsingStrings [CO 2]
6. Execute the 8086 TASM ProgrammingUsingProcedures [CO 2]

Cycle – II: Introduction to Microcontroller Programming and Usage of Software and Boards

(Interfacing Programs)

7. Interface and execute LCD functioning using8086Microprocessor [CO3]
8. Interface and execute Peripheral / Alternate Data Display using 8086 Microprocessor.[CO3]
9. Interface and execute Dancing LEDs pattern usingAT89S52Microcontroller [CO4]
10. Interface and execute LCD operation usingAT89S52Microcontroller [CO 4]
11. Interface and execute Sensor operations usingAT89S52Microcontroller [CO 4]
12. Interface and execute the 7 segment Display usingAT89S52Microcontroller [CO 4]

ADDITIONAL EXPERIMENTS

13. Using Debug Environment perform the addition, multiplication & divisiononno‘s. [CO2]
14. Using 8086 boards display the department and college name intworows. [CO3]
15. Using AT89S52 board interface a temperature sensor and display the value on LCD. [CO4]
16. Using AT89S52 interface a switches & LEDs & display the count ofLEDsON. [CO4]

LINEAR IC APPLICATIONS LAB (LICA(P))

V Semester :ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC307	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Design inverting and non-inverting amplifiers, precision rectifiers using opamp 741 and verify their operation.

CO2: Design application circuits using IC 741 to perform mathematical operations such as Addition, Subtraction, differentiation and integration and verify their operation.

CO3: Design and test waveform generator circuits using IC741, IC 555 Timer and IC 8038

CO4: Design second order active filters (LPF and HPF) and verify their frequency response

CO5: Verify the operation of digital to analog converter constructed using opamp and Test the regulation of IC 723 Voltage regulator.

LIST OF EXPERIMENTS

1. Inverting andnon-invertingamplifiers (CO1)
   a. To design and verify the operation of amplifiers using opamp IC741, in inverting and non-invertingmode
   b. To obtain frequency response and bandwidth ofamplifiers.
2. Summing anddifferenceamplifiers (CO2)
   a. To design application circuits using IC 741 to perform mathematical operations suchas addition,subtraction.
   b. To study the operation of circuits by comparing the theoretical values with practicalvalues
3. IntegratorandDifferentiator (CO2)
   a. To design circuits using IC 741 to perform mathematical operations of Integrationand differentiation
   b. To study the performance of circuits by applying different input waveforms.
4. PrecisionRectifiers (CO1)
   a. To study the operation of Half-wave and Full-wave rectifier circuits constructed usingIC741.
5. Schmitt trigger and squarewavegenerator (CO3)
   a. To design Schmitt trigger and square wave generator circuits for givenspecifications.
   b. To conduct comparative study of the circuit performance for the parameters such asUTP,LTP and outputfrequency.
6. Triangularwavegenerator (CO3)
   a. To design the circuit of triangular wave generator for given specifications and verifythe output for its closeness to theoreticalvalue.
7. Active filters: LowPassFilter (CO4)
   a. To design a Second order Butterworth LPF for given higher cutofffrequency.
   b. To obtain frequency response and practical value of upper cut offrequency.
8. Active filters: HighPassFilter (CO4)
   a. To design a Second order Butterworth HPF for given lower cutofffrequency.
   b. To obtain frequency response and Practical value of lower cut offrequency.

9. Multivibrators using IC 555Timer a. To design multivibrator circuits using IC 555 Timer in monostable and astable modesfor givenspecifications. b. To study the performance of the circuits and obtain width ofo/p pulse from monostable and frequency of o/p square wave from astable circuit.	(CO3)
10. IC 8038 wave formgenerator a. To design and study the performance of waveform generator circuit using IC8038.	(CO3)
11. VoltageRegulator a. To study the regulation performance of IC 723 in low voltage and high voltagemodes.	(CO5)
12. Digital to AnalogConverter a. To study the performance of R-2R ladder type digital to analogconverter. b. To calculate values of LSB, MSB and full scale o/p voltage theoretically andpractically.	(CO5)

EMBEDDED SYSTEMS AND PROGRAMMING (ESP)

VI Semester :ECE					Scheme : 2017			
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC308	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1:Understand the characteristics, attributes and applications of Embedded Systems

CO2: Understand the core structure and microcontroller ports for Embedded applications.

CO3: Analyze the functions and data types of Embedded C in interfacing ports of microcontrollers

CO4: Utilize the architecture and programming model of MSP 430 for peripheral interface

CO5: Understand the architecture and programming model of ARM processors.

UNIT I

INTRODUCION: Definition of Embedded System, Embedded Systems Vs General Computing Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems..

UNIT - II

CORE OF EMBEDDED SYSTEMS: Programming languages for embedded systems,Structural units in embedded processor, Microcontroller Port Structures, Timer Concepts, Interrupts.

UNIT III

PROGRAMMING IN C: Introduction to Embedded C, Data types Functions Hello world program Super Loop architecture, delay function, Controlling the port pins, Reading switches, Basic techniques for reading and writing the port pins, Example: Counting goats.

UNIT IV

MSP430: Family, Architecture – MSP430, Address Space, On Chip Peripheralsand Register sets, Addressing Modes, Programming GPIO Interfaces in C language- LED, Switches, Motor

UNIT-V

ARM Processor:ARM Design Philosophy, RISC vs CISC, ARM 7 and 9 processor family, Block Diagram, Registers, Program Status Register, Five Stage Instruction Pipeline, and Architecture Revision. Instruction Set: Data Processing Instructions, Addressing Mode. Introduction to Thumb Instruction Set.

Text Books :

1. Frank Vahid, *Embedded System Design*, 2nd Edition Wiley Publications,2009
2. Michael J. Point„*Embedded C*" , 1stEdtion, A Pearson Education, 2002.
3. John H. Davies, *MSP430 Microcontroller Basics*, Elsevier, 2008
4. Steve Furber, *ARM System on Chip Architecture*, 2nd Edition, Addsion Wesley Professional,2000.

Reference Books :

1. Raj Kamal, *Embedded Systems Architecture, Programming and design*, 2nd Edition, TMH, 2006.

2. Arnold S Burger,*Embedded System Design An Introduction to Processes, Tools and Techniques*, 1st Edition, CMP Books, 2007.

3. Shibu K.V, *Introduction to Embedded Systems*, Tata Mc Graw Hill, 2009.

Web References:

1.www.nptel.onlinecourse.ac.in/embeddedsystemsdesgin.

2. www.nptel.onlinecourse.ac.in/microcontrollersapplications.

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

DIGITAL SIGNAL PROCESSING (DSP)

<table>
<tr><td colspan="5">VI Semester :ECE</td><td colspan="4">Scheme:2017</td></tr>
<tr><td>Course Code</td><td>Course Category Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">EC309</td><td rowspan="2">PC</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration:2Hrs</td><td colspan="4">End Exam Duration:3Hrs</td></tr>
<tr><td colspan="9">Course Outcomes: On completion of this subject, the student will be able to:</td></tr>
<tr><td colspan="9">CO1: Understand Digital Signal processing and analyze the Signals andSystemsusingFourier AnalyzingTools.</td></tr>
<tr><td colspan="9">CO2: Understand the significance of DFT and its faster computation using FFT Algorithms</td></tr>
<tr><td colspan="9">CO3: Design IIR digital filters with the given specifications and realize the Filter designs.</td></tr>
<tr><td colspan="9">CO4: Design FIR digital filters with the given specifications and realize the Filter designs.</td></tr>
<tr><td colspan="9">CO5: Understand the need for Multi-rate Signal Processing and Adaptive Signal processing.</td></tr>
<tr><td colspan="9"></td></tr>
<tr><td colspan="9">UNIT - I</td></tr>
<tr><td colspan="9">Introduction:
Introduction to Digital Signal Processing, conversion of continuous time signal to discrete time signal, classification of Discrete Time Signals, Testing the Causality and Stability of Linear Shift Invariant Systems, Representing the Discrete Time System as Mathematical Model usingLinear Constant Coefficient Difference Equation, Frequency Domain analysis of Discrete Time Signals and Systems using DFS and DTFT.</td></tr>
<tr><td colspan="9">UNIT - II</td></tr>
<tr><td colspan="9">Discrete Fourier Transforms:
Advantages of DFT over DTFT, Relationship of DFT with DFS, DTFT, and Z-Transforms, Properties of DFT, Circular Convolution, Linear Convolution using circular convolution, Filtering of long data sequences using DFT: Over-Lap Add Method, Over-Lap Save Method, Computational complexity of direct computation of DFT, Introduction to Fast Fourier Transforms, computing N-pointDFTusingRadix-2Decimation-in-TimeandDecimation-in-FrequencyFFTAlgorithmsand Split Radix FFT algorithms, Radix-2 Inverse FFT algorithms.</td></tr>
<tr><td colspan="9">UNIT - III</td></tr>
<tr><td colspan="9">IIR Digital Filters:
Need for Analog filter approximations, Design of Analog Butterworth and Chebyshev filters, Design of IIR Digital Filters from Analog Filters using Approximation of derivatives method, Impulse Invariant method, and Bilinear Transformation Method, Filter transformations in Analog Domains and Digital domains, Realization of IIR digital filters using direct formstructures.</td></tr>
<tr><td colspan="9">UNIT - IV</td></tr>
<tr><td colspan="9">FIR Digital Filters:
Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters using FourierSeries Method, Windowing Method and Frequency Sampling method, Comparison of IIR & FIR filters, Realization of Direct Form and linear phase FIR digitalfilters.</td></tr>
</table>

UNIT - V
Multirate Digital Signal Processing: Introduction, Down Sampling, Up-sampling, Sampling Rate Conversion, Multistage decimator and interpolator, Applications of Multi Rate Signal Processing, Introduction to TMS 320C6713 DSP processor and architecture.
Text Books:
1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley,2009 4. B. Venkata Ramani and M. Bhaskar, Digital Signal Processors, Architecture, Programmingand Applications, TMH, 2004.
Reference Text Books:
1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing - A Computer based approach , Sanjit K Mitra, 3nd Edition, McGrawHill,2008
Web References:
http://www.nptelvideos.in/2012/12/digital-signal-processing.html
https://nptel.ac.in/courses/108105055/34
Question Paper Pattern:
Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach. **End Exam:** Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain subquestions. i.e. there will be two questions from each unit and the student should answer any onequestion.

ANTENNAS & WAVE PROPAGAION (AWP)

VI Semester :ECE					Scheme : 2017			
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC310	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the basic concepts of Antennas and Analyze the Electric and Magnetic field orientation from antennas through mathematicalformulation

CO2: Understand & Evaluate different Arrays & its parameters while designingthat.

CO3: AnalyzethePracticalantennadesigncharacteristicstomeettherequirementofmodernwireless communications.

CO4: Measure the different Parameters of antennas & Evaluate the designperformance.

CO5: Aware of the wave spectrum and respective band antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environmentstructure.

UNIT – I

Antenna Basics

Introduction, Basic Antenna Parameters - Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height. Related Problems.

Thin Linear Wire Antennas

Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam widths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Centre-fed Antennas of Different Lengths, Illustrative Problems. Loop Antennas - Introduction,Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances

UNIT – II

Array of Point Sources & Linear Arrays

Arrays with Parasitic Elements, Yagi - Uda Arrays, - BSA and EFA, Parasitic array, Point source, Power pattern, Examples of power patterns, Field patterns, Array of two isotropic point sources, Pattern multiplication, Linear array of n Isotropic point sources of equal amplitude and spacing (EFA and BSA), Null directions, Binomial array. Folded Dipoles & their characteristics.

UNIT – III

VHF, UHF AND Microwave Antennas - I

Introduction Resonant Antenna and Non Resonant Antenna, Long wire antenna, V –Antenna Inverted V-antenna, Rhombic Antenna, Helical Antenna Reflector Antennas - Introduction, Flat Sheet and Corner Reflectors, Parabolic Reflectors - Geometry, Pattern Characteristics, Feed Methods, ReflectorTypes. Micro-strip Antennas - Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas

UNIT – IV

VHF, UHF AND Microwave Antennas II

Lens Antennas, Geometry of Non-metallic Dielectric Lenses, Log periodic antenna, Introduction to Smart antennas.

Antenna Measurements:
Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT –V

Wave Propagation
Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts.

Ground Wave Propagation
Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections.

Sky Wave PropagationSky wave propagation (neglecting earth's magnetic field), Virtual Height, Critical Frequency, MUF, Skip distance.

Space Wave Propagation
Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super retraction, M-Curves and Duct Propagation, Tropospheric Propagation.

Text Books :

1. J.D. Kraus, Antennas and wave propagation, McGraw Hill, 2010.
2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 2005
3. K.D.Prasad, Antennas and wave propagation, ST India Publications, New Delhi, 2001

Reference Books :

6. E.V.D. Glazier and H.R.L, Lamont Transmission and Propagation, The services text book of Radio, vol.5, Standard Publishers Distributors, Delhi
7. Jordan E.C. and Balmain Electromagnetic waves and Radiating Systems, PHI, Reprint 2003
8. R.E.Collins, Antennas and radio propagation, McGraw-Hill

Web References:

1.www.educypedia.org
2. www.edutalks.org

Question Paper Pattern:

Sessional Exam:
The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:
Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

LINEAR CONTROL SYSTEMS (LCS)

VI Semester :ECE						Scheme : 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
EE311	PC	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the mathematical model and behavior of open loop and closed control system.

CO2: Apply block diagram reduction techniques and Mason's gain formula for finding the transfer function of a given control system.

CO3: Understand standard test inputs, controllers, transient and steady state response for a 2^{nd} order control system for unit step input.

CO4: Apply analytical and graphical techniques to determine the stability of control system in both time and frequency domains.

CO5: Understand concept of compensation, state model, controllability & observability of a systems.

UNIT – I

Equations and Models of Linear Systems:
Open-loop and closed-loop systems, control system components, servomotor, tachometer, synchros, Transfer functions, Determination of transfer function of electrical and mechanical systems, problems.

Block Diagram & Signal flow graph:
Block diagram representation and manipulation, signal flow graphs-mason's gain formula to determine overall system gain of control system, problems.

UNIT - II

***Feedback Characteristics*:**
Feedback and non-feedback systems, effects of feedback, regenerative feedback.

Time Response:
Types of input, transient response of second order system for step input, time-domain specifications, steady state error and error constants, proportional, derivative and integral controls.

UNIT – III

Concept of Stability:
Stability of systems - Routh Hurwitz criterion to determine stability of control systems, problems, Relative stability.

***Root Locus*:**
Concept of root locus, Procedure to plot root locus, Stability analysis of control system by root locus technique, problems.

UNIT - IV

Frequency Response:
Co-relation between time and frequency response, frequency domain specifications, resonant peak (Mp) and resonant frequency (Wp) for a second order system, gain margin(GM) and phase margin (PM).

Frequency Plots:
Bode plots, Polar plots, Nyquist stability criterion for control system, problems.

UNIT - V

Compensation (Without Design):

The necessity of compensation, series and parallel compensation, Realization of basic lead, Lag and lead-Lag compensators.

State Variable Analysis:

Introduction, concepts of state, state variables, state vector, state space, state space representation, state model, state model of linear systems, state transition matrix, solution of state equations. Concept of Controllability and Observability.

Text Books

1. Nagrath and Gopal), –Control systems Engineering‖, New Age International Publications, 2003.
2. B.C.Kuo , –Automatic Control Systems‖, Oxford, 2003.
3. K. Ogata, –Modern control Engineering‖, Pearson, 2003.
4. Naresh - K.Sinha , –Control Systems‖, New Age International Publishers, 1998.
5. B.S.Manke , –Linear Control Systems‖, 1996.

Reference Books

1. Madan Gopal , –Control Systems‖, TMH. 2003.
2. Dorf, Bishop , –Modern Conrtol systems‖, Addison Wesley,1998.
3. Shaum"s out line series , –Feedback control systems‖, TMH,1986.
4. R.C.Shukla, –Control Systems‖, Dhanpat Rai, 2004.
5. Ashok Kumar, –Control Systems–, TMH, 2006.

Web References:

1.https://nptel.ac.in/courses/108106098/

2. https://onlinecourses.nptel.ac.in/noc18_ee41/preview

Question Paper Pattern:

InternalAssessment: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

EndExam: Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any one question

DIGITAL SIGNAL PROCESSING LAB (DSP(P))

VI Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC311	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1:	Perform the convolution and correlation of given signals usingMATLAB.
CO2:	Design IIR and FIR digital filters for the given specifications usingMATLAB.
CO3:	Use DFT-IDFT to perform linear and circular convolution of given sequences usingMATLAB.
CO4:	Perform multirate signal processing usingMATLAB.
CO5:	Use DSK (TMS320C6713) to implement real time signal processingapplications.

List of Experiments

Note : At least 12 of the following experiments shall be conducted

MATLAB Experiments:

1. Linear Convolution of the given DT sequences.
2. Autocorrelation & Cross correlation and verification of Auto correlation Properties.
3. IIR Filter Design – Butterworth
4. IIR Filter Design – Chebyshev
5. FIR Filter Design – Windowing Method
6. Circular Convolution using DFT- IDFT method
7. Linear convolution using DFT and IDFT method
8. Implementation of interpolation and decimation operations.
9. Implementation of I/D sampling rate converters

Using DSP Starter Kit (TMS329C6713) :

10. Linear convolution & Circular Convolution.
11. N-Point DFT & Computation of non-real time PSD.
12. Design of FIR Filters.

Additional Experiments:

13. To find frequency response of a given system given in Transfer Function/Differential equation form.(MATLAB)
14. Implementation of audio loopback. **(TMS329C6713)**
15. Implementation of adaptive algorithm for noise cancellation. **(TMS329C6713)**

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009
4. Digital Signal Processing - A Computer based approach , Sanjit K Mitra, 3nd Edition, McGrawHill,2008

VLSI AND EMBEDDED SYSTEMS LAB (VES(P))

VI Semester: ECE						Scheme:2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC312	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: Design back-end design of combinational and sequential circuits

CO2: Analyze MOSFET based applications like amplifiers, oscillators, memories

CO3 :Perform programming on MSP430 and TIVA processors.

CO4: Interface and control real time peripherals using MSP430 and TIVA processors.

LIST OFEXPERIMENTS

1. CMOS gates {INV, NAND, AND, NOR, OR, XNOR, XOR, AOI, OAI, MUX}
2. Transmission Gates+ TG based Applications
3. HA, FA, HS, FS
4. Latches, FFs with RESETS capability
5. Amplifiers {CS [b], CD, CG, Differential, Op-Amp}
6. Integrator, Differentiator, Filters [a]
7. DAC [a] {R-2R Ladder, SAR}
8. Memory Design&- SRAM/DRAM
9. Write a C program for configuration of GPIO ports for MSP430 to interface LEDs.
10. Write a C program for configuration of GPIO ports for MSP430 to interface pushbuttons
11. Write a C program for configuration of GPIO ports for MSP430 blinking Array of LEDs
12. Write a C program for interfacing a DC Motor with MSP430.
13. Write a C program for Interface with onboard Temperature Sensor
14. Interfacing of on board led using tiva processor TM4C123GXL
15. Interfacing of On- Board Button LED using tiva processor TM4C123GXL
16. Interfacing of RGB LED using tiva processor TM4C123GXL

Analysis used	One or more of Transient, DC and AC analysis
Platform	REDHAT Enterprise LINUX 6.5
EDA Tools	Cadence Virtuoso
ASIC Technology	gpdk180nm/gpdk90nm/gpdk45nm
Steps Followed	Design the schematic → Simulation using stimuli →Layout → DRC→LVS→ Parasitic Extraction → Simulation → GDSII generation

MICROWAVE ENGINEERING (MWE)

VII Semester :ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC401	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the operation of guided waves and waveguides

CO2: Analyze passive microwave devices using scattering parameters.

CO3: Study the performance of specialized microwave tubes such as klystron, reflex klystron, magnetron and Travelling wave tube.

CO4: Understand the limitations of existing vacuum tubes and solid state devices at microwave frequencies

CO5:Analyze microwave components and circuits with standard microwave bench

UNIT – I

Guided Waves and Wave Guides:

Microwave frequencies advantages and applications, Rectangular and circular wave guides. Wave equations rectangular and circular wave guides for TE and TM modes, Cutoff frequency and wave length, Group and phase velocity, Wave impedance, Guide attenuation, Rectangular and cylindrical resonators, Q of the resonators.

UNIT – II

Passive Microwave Devices:

Introduction to Scattering parameters and its properties, Derivation of S- matrix for E-plane, H-plane, Magic tee, directional couplers, Hybrid ring. Microwave propagation in ferrites, Faraday rotation, Gyrator Circulator and isolators.

UNIT – III

Microwave Tubes:

Velocity modulation, Current modulation, Operation and performance of two-Cavity klystron, Reflex klystron oscillator Travelling wave tube (TWT) amplifier. Magnetron: Magnetron- mode separation, frequency pushing and frequency pulling and applications.

UNIT – IV

Microwave Solid State Devices:

PIN diode, Varactor diode,GUNN diode, IMPATT, TRAPATT and BARITT Diodes

UNIT –V

Microwave Measurements:

Bolometric and thermocouple methods for measurement of power, Frequency, Attenuation, VSWR, Impedance measurement and measurement of scattering parameter for 3 and 4 port devices.

Text Books :

1. Samuel Y.Liao, *Microwave devices and circuits*, 3rd Edition, PHI 2003.
2. M. Kulkarni, *Microwave & Radar Engineering*, 3rd Edition, Umesh Publications 2003.

Reference Books :

1. O P Gandhi, *Microwave Engineering and Applications*, Pergamon Press 1989.
2. R.E. Collins, *Foundation of Microwave Engineering*, 2nd Edition, Wiley 2003.
3. E.C. Jordan and Balmain, *EM Fields & Waves and Radiating System*, 2nd Edition, PHI 2003.
4. Sushrut Das, *Microwave Engineering*, 1st Edition, Oxford University Press, 2014

Web References:

1.http://nptel.ac.in/courses/117106086/1

2.http://www.nptelvideos.in/2012/12/digital-systems-design.html

3.http://www.nptelvideos.in/2012/12/digital-circuits-and-systems.html

4.http://nptel.ac.in/courses/117105080/

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

DIGITAL SYSTEM DESIGN USING VERILOG (DSDV)

VII Semester: ECE								Scheme:2017
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC402	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1:Analyze the digital design and verification flow and importance of Verilog in that flow

CO2:Understand Verilog language constructs which will be used for design and verification.

CO3:Simulate the combinatorial logic circuits with Verilog coding styles.

CO4: Represent the sequential circuits with Verilog by using suitable coding styles.

CO5: Model the switch-level components with the help of Verilog language constructs.

UNIT-1

Digital System Design Automation With Verilog

Detailed Digital Design Flow, Verilog HDL

Register Transfer Level Design With Verilog

RT Level Design, Elements of Verilog, Component Description in Verilog, Testbenches, Summary, Problems.

UNIT-2

Verilog Language Concepts

Characterizing Hardware Languages, Module Basics, Verilog Simulation Model, Compiler Directives, System Tasks and Functions, Summary, Problems.

UNIT-3

Combinational Circuit Description

Module Wires, Gate Level Logic, Hierarchical Structures, Describing Expressions with Assign Statements, Behavioral Combinational Descriptions, Combinational Synthesis, Summary, Problems

UNIT-4

Sequential Circuit Description

Sequential Models, Basic Memory Components, Functional Registers, State Machine Coding, Sequential Synthesis, Summary, Problems

UNIT-5

Detailed Modeling

Switch Level Modeling, Strength Modeling: Strength values, Strength used in resolution, Strength reduction, Summary, Problems

Text Books:

1. ZainalabedinNavabi. 2005. *Verilog Digital System Design*. McGraw-Hill Professional.
2. Samir Palnitkar. 2003. *Verilog® HDL: A Guide to Digital Design and Synthesis, Second Edition* (2nded.). Prentice Hall Press, Upper Saddle River, NJ, USA.

Reference Books:

1. Stephen D. Brown and Zvonko G. Vranesic. 2002. *Fundamentals of Digital Logic with VERILOG Design* (1sted.). McGraw-Hill, Inc., New York, NY, USA.
2. Mano, M. Morris, and Michael D. Ciletti. 2018. *Digital design: with an introduction to the Verilog HDL, VHDL, and SystemVerilog*.

3. J. Bhasker. 1998. *Verilog HDL Synthesis: A Practical Primer*. Star Galaxy Publishing.

4. Michael D. Ciletti. 2010. *Advanced Digital Design with the Verilog HDL* (2nd ed.). Prentice Hall Press, Upper Saddle River, NJ, USA.

Web References:

1.https://semiengineering.com/entities/open-verilog-international/

2. https://www.doulos.com/knowhow/verilog_designers_guide/

3. http://www.verilog.com/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

MICROWAVE COMMUNICATIONS LAB (MWC(P))

VII Semester : ECE					Scheme : 2017			
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC403	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the working principle and measure characteristics of various microwave active devices.

CO2: Measure frequency, wavelength and VSWR at microwave frequencies.

CO3: Measure the S-Matrix of various microwave passive devices.

CO4: Demonstrate analog and digital fiber optic communication link and measure propagation loss, numerical Aperture of a fiber opticcable.

List Of Experiments

1. Reflex klystron oscillator characteristics
2. Frequency,wave length and VSWR measurement
3. Gunn diode characteristics
4. Impedance measurement of unknown load
5. S – Matrix of e plane tee and h plane tee
6. S – Matrix of magic tee
7. S – Matrix of circulator
8. S – Matrix of directional coupler
9. Radiation pattern of horn antenna
10. A) Analog and digital fiber optic communication link
    B)Measurement of propagation loss,numerical aperture and study of bending loss
11. Radiation pattern of helix antenna
12. Radiation pattern of cut paraboloid reflector antenna

DIGITAL SYSTEM DESIGN LAB (DSD(P))

VII Semester: ECE								Scheme:2017
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
EC404	PC	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		0	0	2	1	50	50	100
						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the lab the student will be able to

CO1: Design combinational logic circuits.

CO2: Design sequential logic circuits.

CO3:Design simple ALU Design.

LIST OF EXPERIMENTS

1. Arithmetic Circuits {Adders, Subtractors, Multiplier}
2. Digital Circuits {MUX, DEMUX, DECODER,ENCODER}
3. Code Converters {BIN2GRAY, GRAY2BIN, BCD2EXCESS3, EXCESS32BCD}
4. Flip-Flops Sync/Async. RESETS {D, T, S-R, J-K}
5. Counters {UP/DOWN, Ring, Johnson}
6. FSMs {Mealy/Moore/Sequence detector}
7. Shift Register {SISO, SIPO, PISO, PIPO}
8. Memories {ROM, RAM, FIFO(Queue), CAM}
9. Cache {I-cache, D-cache}
10. Simple ALU Design

HDL used	Verilog in behavioral/Data-flow/Structural modelling styles where applicable
Platform	REDHAT Enterprise LINUX 6.5/Windows 10 (64-bit)
EDA Tools	Cadence NCSIM (Simulation) Cadence Encounter/Xilinx Vivado IDE (Synthesis and Implementation)
FPGA Board	Xilinx NexysA7 board
ASIC Technology	gpdk180nm/gpdk90nm/gpdk45nm
Steps Followed	Verilog RTL Coding → Simulation using Testbenches → RTL Synthesis → Implementation → FPGA Configuration/GDSII file generation

PYTHON PROGRAMMING (PP)

V Semester :ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL1	PE-I	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the features and applications of python programming

CO2: Write simple programs using the data types and variables

CO3: Write programs using control structures and operators

CO4: Utilize the functions in framing simple programs with arguments

CO5: Understand the modules and packages of python programming

UNIT I

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL (Shell), Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT II

Variables and Types: Types - Integers, Strings, Booleans Variables, Data Types- Strings, Numbers, Booleans, Date and Time. Lists, Tuples, Dictionaries.

UNIT III

Operators: Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators. if, if-elif-else, for, while, break, continue, pass

UNIT IV

Functions – Defining Functions, Calling a Function, Function Arguments: Required arguments, Keyword arguments, Default Arguments, Variable-length arguments, Anonymous Functions, The Return Statement.

UNIT-V

Modules: Defining module, name spacing, Importing modules and module attributes, from. Import statement, Module built-in functions, Introduction to Packages.

Text Books :

1. VamsiKurama ,*Python Programming: A Modern Approach*, Pearson, 1st Edition,2018
2. Wesley J. Chun ,Core Python Applications Programming, Prentice Hall, 2012

Reference Books :

1. Andrew Johansen *Python -The Ultimate Beginner"s Guide!* ,
2. Mark Lutz *Learning Python*, Orielly

Web References:

1.www.nptel.onlinecourse.ac.in/pythonprogramming.

2. www.nptel.onlinecourse.ac.in/pythonapplicationsanddatastructures

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (EMI)

V Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL2	PE-I	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the characteristics of an instrumentation system and analyze the errors in measurements and their rectification.

CO2: Analyze different AC Bridge circuits used for the measurement and also Analog & Digital Instruments.

CO3: Understand the major components present in CRO and different types of Sensors and Transducers.

UNIT – I

Measurement and Error: Measurement, Generalized measurement system, Static and dynamic characteristics of Instrumentation system, Calibration, errors and their statistical analysis, PMMC instrument, specifications of an instrument, Electronic voltmeters-AC voltmeters using rectifiers,ammeters and multimeters.

UNIT – II

AC bridges: Condition for Bridge Balance, Measurement of Inductance-Maxwell bridge, Measurement of capacitance-Schering bridge. Measurement of Resistance- Kelvin bridge, Wheatstone bridge. Hay's bridge, Wein Bridge, LCR Bridge and Q-meter.

UNIT – III

Analog & Digital Instruments: Standard and AF sine & square wave signal generators, Function generators, Wave analyzers, Harmonic distortion analyzer, Spectrum analyzer, Analog Vs Digital instruments, Principle & operation of DVMs-Ramp type, Dual slope type, Successive approximation type,Digital frequency meter.

UNIT – IV

CRO: Basic CRO operation, Deflection sensitivity, Cathode ray tube, Time base circuits, Delay line, CRO probes, measurements with CRO, Lissajous Figures, Analog storage CRO, Digital storage CRO, Sampling oscilloscope.

UNIT – V

Transducers: Sensors and Transducers, Classification & Selection of transducers, Temperature Sensors, Temperature transducers, Strain gauges, LVDT, Piezo electric transducers. Measurement of physical parameters-Force, Velocity, Acceleration, Pressure, Speed, Displacement and Humidity.

Text Books :

1. William D. Cooper & Albert D. Helfrick, Modern Electronic Instrumentation and Measurement Techniques, PHI, 2nd Edition, 1990.
2. A.K. Sawhney, A course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co., (Pvt). Ltd., Nineteenth Edition, 2011.

Reference Books :

1. K. Lal Kishore, Electronic Measurements and Instrumentation, Pearson Education, 2012.
2. J.B. Gupta, A course in Electronics & Electrical Measurements and Instrumentation, S.K. Kataria and Sons, 2012.
3. D.V.S Murthy, Transducers and Instrumentation, PHI, 2nd Edition, 2013.

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

ADVANCED COMPUTER ARCHITECTURE (ACA)

V Semester: ECE								Scheme:2017
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL3	PE-I	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: Discuss various computer abstractions and technologies.

CO2: Interpret instructions which are useful in a computer system.

CO3: Break-down the design of processor into basic modules.

CO4: Apply memory hierarchy for betterment of computer operation.

CO5: Infer the working and need of parallel processors.

UNIT-1

Computer Abstractions and Technology:

Introduction, Eight Great Ideas in Computer Architecture, High-Level Language to the Language of Hardware, Technologies for Building Processors and Memory, Performance, The Power Wall, The Switch from Uniprocessors to Multiprocessors, SPEC CPU Benchmark, SPEC Power Benchmark, Measuring Performance

UNIT-2

Instructions, the Language of the Computer:

Introduction, Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsigned Numbers, Logical Operations, Instructions for Making Decisions, Supporting Procedures in Computer Hardware, Parallelism and Instructions: Synchronization, Translating and Starting a Program

UNIT-3

The Processor*:*

Introduction, Logic Design Conventions, Clocking Methodology, Building a Datapath, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, Data Hazards, Control Hazards, Exceptions, Parallelism via Instructions, Instruction-Level Parallelism and Matrix Multiply

UNIT-4

Exploring Memory Hierarchy:

Introduction, Memory Technologies, The Basics of Caches, Measuring andImprovingCache Performance, Dependable Memory Hierarchy, Virtual Machines, Virtual Memory, Using an FSM to Control a Simple Cache, Parallelism and Memory Hierarchy, Cache Blocking and MatrixMultiply

UNIT-5

Parallel Processors:

Introduction, The Difficulty of Creating Parallel Processing Programs, SISD, MIMD, SIMD, SPMD,Hardware Multithreading, Multicore and Other Shared Memory Multiprocessors, Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers, and Other Message-Passing Multiprocessors, Introduction to Multiprocessor Network Topologies, Communicating to the Outside World: Cluster Networking

Text Books:

1. David A. Patterson and John L. Hennessy. *Computer Organization and Design: The Hardware Software Interface ARM Edition* (1st ed.). Morgan Kaufmann Publishers Inc., San Francisco, CA, USA, 2016.
2. John L. Hennessy and David A. Patterson,*Computer Architecture, Sixth Edition: A Quantitative Approach* (6th ed.). Morgan Kaufmann Publishers Inc., San Francisco, CA, USA, 2017.

Reference Books:

1. David A. Patterson and John L. Hennessy,*Computer Organization and Design RISC-V Edition: The Hardware Software Interface* (1st ed.). Morgan Kaufmann Publishers Inc., San Francisco, CA, USA, 2017.
2. Kai Hwang and Faye A. Briggs,*Computer Architecture and Parallel Processing* (1st ed.). McGraw-Hill, Inc., New York, NY, USA, 1990.
3. Kai Hwang,*Advanced Computer Architecture: Parallelism,Scalability,Programmability* (1st ed.). McGraw-Hill Higher Education, 1992.
4. William Stallings,*Computer Organization and Architecture: Designing for Performance* (11th ed.). Prentice Hall Press, Upper Saddle River, NJ, USA, 2009.

Web References:

1. https://nptel.ac.in/courses/106105033/
2. https://nptel.ac.in/courses/106102062/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

DATA COMMUNICATIONS AND NETWORKING (DCN)

VI Semester :B.Tech ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL4	PE-II	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Acquire the knowledge about the layered structure of reference models for computer networks, the concepts of Physical Layer like transmission media, transmission impairments, data modems, switching and multiplexing standards.

CO2: Understand the principles of Error detection, error correction, Flow control, medium access control in the Data Link Layer and IEEE standards for LANs.

CO3: Understand the various types of static and dynamic routing algorithms, congestion control and avoidance in Network Layer

CO4: Analyze the Process to Process Delivery using TCP, UDP in transport layer and the cryptography algorithms like DES and RSA in session layer.

CO5: Understand various application layer protocols like DNS, FTP, HTTP,WWW, SMTP, SNMP

UNIT – I

Introduction to Data Communication Networks: Network Services and Architecture. The Internet, Protocols and Standards, Network Models: Layered Tasks, OSI Reference model, TCP/IP Protocol suite, Data communication circuits, Serial and parallel data transmission, Data communication circuit arrangements.
Physical Layer and Media: Periodic Analog Signals, Digital Signals, Transmission impairment, Data Rate Limits, Performance., Transmission media, Data modems, Switching and Multiplexing (FDM, TDM & WDM).

UNIT – II

Data Link Layer: introduction, Framing, Error Detection and Correction- Parity, LRC, CRC, Hamming code, Flow and Error Control Protocols, HDLC,**Multiple Access**: Aloha, Controlled Access, Channelization, **IEEE Standards**: Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet, wireless LANs.

UNIT – III

Network Layer: Virtual circuit and datagram approach in subnets, Shortest path routing, Flooding, Hierarchical routing, Broadcast routing, multicast routing and distant vector routing algorithms, Congestion control algorithms

UNIT – IV

Transport Layer: Transport services, addressing, upward and downward multiplexing, TCP and UDP.
Session Layer:-Encryption, Ciphers, Types of ciphers, DES Algorithm, Public key cryptography-RSA Algorithm.

UNIT –V

Application Layer: DNS, DNS in internet, FTP, HTTP, WWW, SMTP, SNMP

Text Books :

1.Behrouz.A. Forouzan, *Data communications and Networking*, Second edition, TMH, 2003.

2. Andrew S. Tanenbaum, *Computer Networks*, Third edition, PHI, 2001.

3. Wayne Tomasi (2005), Introduction to Data Communications and Networking, Pearson Education, India.

Reference Books :

1. William Stallings, *Data and Computer Communications*, 3rd edition, Pearson, 2007.

Web References:

1.https://nptel.ac.in/courses/106105081/

2. https://nptel.ac.in/downloads/106105080/

3. https://nptel.ac.in/courses/106106091/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 40 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

ANALOG VLSI (AVLSI)

VI Semester: ECE						Scheme:2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL5	PE-II	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: Understand MOS device Physics w.r.t to Analog design.

CO2: Evaluate the differences between single-state amplifiers and differential amplifiers.

CO3: Analyze current mirrors with biasing techniques as well as frequency response of amplifiers.

CO4: Exploring operational amplifiers with possible applications.

CO5:Studying frequency compensation techniques for stability and switched capacitor circuits.

UNIT-1

Introduction to Analog Design and Basic MOS Device Physics:
General Considerations, MOS I/V Characteristics, Second-Order Effects, MOS Device Models, FinFETs, Behavior of a MOS Device as a Capacitor.

UNIT-2

Single-Stage Amplifiers:
Applications, General Considerations, Common-Source Stage, Source Follower, Common-Gate Stage, Cascode Stage, Choice of Device Models. **Differential Amplifiers**: Single-Ended and Differential Operation, Basic Differential Pair, Common-Mode Response, Differential Pair with MOS Loads, Gilbert Cell

UNIT-3

Current Mirrors and Biasing Techniques:
Basic Current Mirrors, Cascode Current Mirrors, Active Current Mirrors, Biasing Techniques.**Frequency Response of Amplifiers**: General Considerations,Common-Source Stage, Source Followers, Common-Gate Stage, Cascode Stage, Differential Pair, Gain-Bandwidth Trade-Offs

UNIT-4

Operational Amplifiers:
General Consideration, One-Stage Op Amps, Two-Stage Op Amps, Gain Boosting, Comparison, Output Swing Calculations, Common-Mode Feedback, Input Range Limitations, Slew Rate, High-Slew-Rate Op Amps, Power Supply Rejection, Noise in Op Amps

UNIT-5

Stability and Frequency Compensation:
General Considerations, Multipole Systems, Phase Margin, Basic Frequency Compensation, Compensation of Two-Stage Op Amps, Slewing in Two-Stage Op Amps, Other Compensation Techniques, Nyquist's Stability Criterion.**Switched-Capacitor Circuits**:General Considerations, Sampling Switches,Switched-CapacitorAmplifiers,Switched-CapacitorIntegrator,Switched-CapacitorCommon-Mode Feedback

Text Books:

1. Behzad Razavi. 2016. *Design of Analog CMOS Integrated Circuits* (2nd ed.). McGraw-Hill, Inc., New York, NY, USA.

Reference Books:

1. Paul R. Gray. 2009. *Analysis and Design of Analog Integrated Circuits* (5th ed.). Wiley Publishing.
2. T. C.Carusone, Martin D Johns, K. W. Martin. 2012. *Analog Integrated Circuit Design*(2nd ed.). John Wiley & Sons

Web References:

1.https://nptel.ac.in/syllabus/117106030/

2.https://nptel.ac.in/courses/117101106/

3.https://nptel.ac.in/syllabus/108106105/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

INTERNET OF THINGS (IoT)

VI Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL6	PE-II	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the basic knowledge of Internet of things and its design

CO2: Understand the purpose of sensors and Actuators in IoT

CO3: Analyze Various IoT Protocols

CO4: Design IoT Projects Using Arduino

CO5: Understand Raspberry-Pi Processor and Raspbian Operating Systems

UNIT – I

Introduction to IoT:

Definition and Characteristics of IoT, Physical Design and Logical Design, IoT Enabling Technologies, IoT Levels and Deployment Templates, IoT Vs M2M

UNIT – II

Sensing and Actuation:

Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT

UNIT – III

Wireless Technologies and Data Transmission for IoT:

Wi-Max, Wi-Fi (802.11), Bluetooth/Bluetooth smart,Zigbee/Zigbee smart, Cellular, NFC,Serial Transmission, RS-232, RS-485, I2C Inter-Integrated Circuit, Ethernet, CAN bus, USB, Firewall, Serial ATA, Parallel Transmission

UNIT – IV

Building IoT with Arduino:Arduino IDE, Programming of Arduino, Interfacing LED, switch, potentiometer, Sensors, LCD, Bluetooth, Wi-Fi, ,GPS, RFID with Arduino

UNIT –V

Raspberry Pi :

Linux basics, Linux File system, Navigating the File system, Text Editors, Accessing Files, Permissions , Processes, Linux Graphic user Interface , Raspberry Pi Processor, Raspberry Pi Vs Arduino, Operating system benefits, Raspberry Pi Set up, Configuration,

Text Books :

1. ArsheepBahga , Vijay Madisetti ,Internet of Things: A Hands-On Approach Paperback,2015
2. Rajkumar Bhuyya ,Internet of Things : Principles and Paradigms,2016.
3. Adeel Javed , Building Arduino Projects for the Internet ofThings,Apress,2016.
4. Wolfram Donat, Learn Raspberry-Pi withPython,Apress,2016.

Reference Books :

1. Charles Bell,Beginning Sensor Networks with Arduino and Raspberry-Pi,Apress,2016
2. AndrianMcEwen , Hakim Casimally ,Designing of Internet of Things, John Wiley,2014
3. Warren Gay,Masteringthe Raspberry-Pi,Apress,2016

Web References:

1. https://nptel.ac.in/courses/106105166/
2. https://onlinecourses.nptel.ac.in/noc17_cs22/course
3. https://nptel.ac.in/courses/108108098/4
4. https://onlinecourses.nptel.ac.in/noc19_ee28

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains hree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

CODING TECHNIQUES (CTH)

<table>
<tr><td colspan="5">VII Semester : ECE</td><td colspan="4">Scheme : 2017</td></tr>
<tr><td>Course Code</td><td>Course Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">ECEL7</td><td rowspan="2">PE-III</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>TOTAL</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration : 2 Hrs</td><td colspan="4">End Exam Duration: 3 Hrs</td></tr>
<tr><td colspan="9">Course Outcomes : At the end of the course the student will be able to</td></tr>
<tr><td colspan="9">CO1: Understand mathematical concepts related to coding</td></tr>
<tr><td colspan="9">CO2: Analyze source-coding and channel-coding techniques.</td></tr>
<tr><td colspan="9">CO3: Analyze encoding and decoding of the linear block codes, cyclic codes.</td></tr>
<tr><td colspan="9">CO4: Familiar with encoding and decoding of Convolutional Codes .</td></tr>
<tr><td colspan="9">CO5: Explain the concepts involved in formulation and computation Codes Binary BCH Codes.</td></tr>
<tr><td colspan="9"></td></tr>
<tr><td colspan="9">UNIT – I</td></tr>
<tr><td colspan="9">Source Coding:
Mathematical models for information. A logarithmic measure of information. Average and Mutual information and Entropy, Information measures for continuous random variable. Coding for discrete sources: Coding for discrete memory less sources discrete stationary source, Shannon-Fano coding, Huffman code, Huffman code applied for pair of symbols, efficiency calculations, Lempel-Ziv codes.</td></tr>
<tr><td colspan="9">UNIT – II</td></tr>
<tr><td colspan="9">Channel Capacity And Coding:
Channel models, channel capacity, achieving channel capacity with orthogonal signals, channel reliability functions, Random selection of codes, Communication system design based on the cufoff rate.</td></tr>
<tr><td colspan="9">UNIT – III</td></tr>
<tr><td colspan="9">Linear Block Codes And Cyclic Codes:
The generator matrix and parity check matrix, Optimum soft and hard decision decoding linear block codes, Nonbinary block codes and concatenated block codes, Interleaving of coded data for channels with burst errors.</td></tr>
<tr><td colspan="9">UNIT – IV</td></tr>
<tr><td colspan="9">Convolutinal Codes:
Convolutional encoder: code tree,state transition diagram, trellis diagram
Decoding convolutional codes: Maximum likelihood decoding, Wozencrafts sequential decoding, fans decoding.</td></tr>
<tr><td colspan="9">UNIT – V</td></tr>
<tr><td colspan="9">BCH Codes:
Idempotent and Mattson – Solomon Polynomials, Reed-Solomon Codes, Justin Codes, MDS Codes, Alternate, Goppa and Generalized BCH Codes, Spectral properties.</td></tr>
<tr><td colspan="9">Text Books :</td></tr>
<tr><td colspan="9">1.John G.Proakis, Digital Communications, 3rd edition, McGraw Hill, 1995.</td></tr>
<tr><td colspan="9">2. S. Haykin, Digital Communications, John Wiley & Sons, 2009.</td></tr>
<tr><td colspan="9">3. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice all.</td></tr>
</table>

Reference Books :

1. Shu Lin, Daniel J. Costello, Jr., –Error Control Coding,| Pearson Publications, Second Edition, 2011.
2. Digital Communications-Fundamental and Application - Bernard Sklar, PE.2010,TMH
3. K. Sam Shanmugam, –Digital and Analog Communication Systems|, Wisely Publications,2009

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

EMBEDDED RTOS (ERTOS)

VII Semester :ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL8	PE-III	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the embedded system architecture and individual components

CO2: Understand the Real Time Systems and applications

CO3: Understand the debugging tools for suitable RTOS Environments

CO4: Analyse the Inter process communication algorithms to avoid deadlocks

CO5: Utilize the UNIX and Linux file commands for system call and shell programming

UNIT I

Hardware and Software: Evolution of OS, Processor selection for an embedded system,Software languages for embedded systems, Board memory: ROM – RAM – cache – auxiliary memory –memory management – memory performance.

UNIT II

Real Time Systems: Hard Real-time systems, Soft Real-time systems. Time based application, Event Triggered applications, Elevator, Digital Camera, Mobile Phone, A set of Robots

UNIT III

RTOS Functioning: Differences between Traditional OS and RTOS. Architecture of OS (Monolithic, Microkernel, Layered, Exo-kernel and Hybrid kernel structures).RTOS Kernel & Process Management. Create, Ready, Run, Interrupt, Wait and Terminate States. Inter task Communication & Synchronization, Context Switching.

UNIT IV

Inter process Communication: Deadlocks, Prevention, Avoidance, Classical Uniprocessor Scheduling Algorithms, RMS, Pre - emptive EDF. IPC through Semaphores, Mutex, Mailboxes, Message Queues or Pipes and Event Flags.

UNIT-V

UNIX Operating System: UNIX Kernel, File system, Concepts of, Process, Concurrent Execution & Interrupts. Process Management, forks & execution. Programming with system calls, Process Scheduling, Shell programming and filters, Linux functions.

Text Books :

1. Raj Kamal, Embedded Systems Architecture, Programming and design, 2nd Edition, TMH, 2006.
2. Frank Vahid, Tony Givargis, –Embedded System Design‖ Wiley- India 3rd Edition, 2009.
3. Qing Li ,*Real Time Concepts for Embedded Systems*, Elsevier, 2011

Reference Books :

1. Silberschatz, Galvin and Gagne*Operating System Concepts* , 8th Edition ©2009
2. Dr. Craig Hollabaugh*Embedded Linux: Hardware*, Software and Interfacing Dr. Craig Hollabaugh
3. Jean.J.Labrosse ,*MicroC/OS-II*, , 2nd Edition,Elsevier, 2012, CMP Books.

Web References:

1.www.nptel.onlinecourse.ac.in/embeddedsystemsdesgin.

2. www.nptel.onlinecourse.ac.in/realtimeoperatingsystems

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

DIGITAL IMAGE PROCESSING (DIP)

VII Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
ECEL9	PE-III	3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the concepts of image, image processing system and various operations that can perform on digital images.

CO2: Analyze images in the spatial and frequency domains

CO3: Apply various image restoration techniques on images

CO4: Analyze various image compression and segmentation techniques

CO5: Apply the various mathematical transforms and color image concepts on digital images

UNIT – I

Definition, Applications Of Digital Image Processing, Fundamental Steps, Components Of Image Processing System, Human Visual System, Simple Image Formation Model, Image Sampling And Quantization, Spatial And Gray Level Resolution, Image Interpolation, Some Basic Relationships Between Pixels, Linear And Non Linear Operations.

UNIT –II

Image Enhancement :

Spatial Domain: Basic Gray Level Transformations, Histogram Processing, Enhancement Using Logical And Arithmetic Operations, Image Subtraction, Image Averaging, Basic Of Spatial Filtering, Smoothing And Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Frequency Domain: Introduction To Fourier Transforms, Basics Of Filtering In Frequency Domain, Fundamental Steps In Filtering In Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering.

UNIT –III

Image Restoration: Model Of Image Degradation/Restoration Model, Noise Models, Restoration In Presence Of Noise Only-Spatial Filtering, Periodic Noise Reduction By Frequency Domain Filtering, Linear PositionInvariant Derivations, Algebraic Approach To Restoration, Inverse Filtering, Least Mean Square Filters, ConstrainedLeast Squares Restoration,

UNIT – IV

Image Compression: File format (bmp, tiff, pcx, gif, jpeg.), Compression fundamentals, Image Compression Models, Error Free Compression: VLC, Arithmetic Coding, Bit plane Coding, Lossless Predictive Coding, Lossy Compression: Lossy Predictive Coding, Block Transformcoding,

Image Segmentation: Fundamentals, Detection of Discontinuities: Point, Line, Edge detection, Edge Linking and Boundary Detection: Local Processing, Global Processing via Hough Transform.

UNIT – V

Image Transform: Introduction One and Two Dimensional Discrete Fourier Transform (DFT), Properties of DFT, Properties of Discrete Cosine and Sine transforms, Properties of Slant, KL transforms.

Color Image Processing: Color fundamentals, Color models: RGB, CMY and CMYK, HSI, Converting colors from RGB to HIS, HIS to RGB manipulating HIS component images, Pseudo color Image Processing, Full Color Image Processing.

Text Books :

1. Rafael Gonzalez & Richard Woods, *Digital Image Processing*, 3rd Edition. Pearson publications, 2012.
2. Anil K. Jain, *Fundamental of Digital Image Processing*, PHI publication, 2013.

Reference Books :

1. Pratt, *Digital Image Processing*, 2nd Edition, Wiley Publication, 1991.
2. S. Jayaraman, S. Esakkirajan & T. Veera Kumar, *Digital Image Processing*, Mc. Graw Hill, 2011.
3. S. Sridhar, *Digital Image Processing*, Oxford University Press, 2011.

Web References:

1. https://nptel.ac.in/courses/117105079/
2. https://nptel.ac.in/courses/117104069/
3. https://nptel.ac.in/courses/106105032/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach.

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questionscarrying10markseach.Eachofthesequestionsisfromoneunitandmaycontainsub-questions.i.e.
there will be two questions from each unit and the student should answer any one question.

FIBER OPTIC COMMUNICATIONS (FOC)

VII - Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL10	PE-IV	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1:	Understandtheelementsoffiberopticcommunicationsystemandtheirworkingprinciplesbased on optical laws anddefinitions.
CO2:	Evaluate the attenuation and dispersion in opticalfibers.
CO3:	Understand the Structures, working principles of optical sources and detectors and analyzethe performance of analog and digitalreceivers.
CO4:	Analyze the fiber optic communication system through power budget and rise timebudget analysis.
CO5:	Understand basics of source to fiber power launching, optical amplifiers andoptical networks likeSONET/SDH

UNIT – I

Overview of Optical Communications:
Introduction and Historical background, Elements of optical fiber communication, Advantages & Applications of optical fibers.
Optical Fiber Waveguides:
Nature of light-Spherical and planar wave fronts, Basic optical laws and definitions, Optical fiber modes and configurations, Mode theory of circular waveguides, Single and multimode step index fibers, Fiber materials andfabrication.

UNIT – II

Signal Degradation in Optical Fibers:
Attenuation-Absorption, Scattering and bending losses in optical fibers, Core and cladding losses.
Signal dispersion in optical waveguides:
Intra modal dispersion (Material dispersion and wave guide dispersion), Intermodal dispersion, Pulse Broadening

UNIT – III

Optical Sources and Photo Detectors:
LED's –Structures, Light source materials, Internal quantum efficiency, Modulation capability, principles and operation of Febry perot and DFB laser diodes, Physical principles of PIN and APD, Noise in photo detectors.

UNIT – IV

***Optical Receiver and Digital Transmission Systems*:**
Fundamental receiver operation, Digital receiver performance calculation, Analog receivers, Point -to-point links, Link power budget, Rise-time budget, Wavelength Division Multiplexing (WDM)
Power Launching in Optical fibers:
Source-to-fiber power launching basics, fiber joints and splices, fiber connectors.

UNIT – V

Optical Amplifiers:

Basic operation ofSemiconductor optical amplifiers, Amplifier gain, Amplificaiton mechanism of Erbium-doped fiber amplifiers, EDFA architecture,

Optical Networks:

Basic concepts of SONET/SDH, Transmission formats and speeds, SONET/SDH Rings, SONET/SDH Networks.

Text Books :

1. Gerd Keiser, Optical Fiber Communications, 3rd Edition, Mc Graw Hill,2004.
2. John M. Senior, Optical Fiber Communications Principles and Practice, 2nd Edition,Pearson, 2009.

Reference Books :

1. D.C. Agarwal, Fiber Optic Communication, 2nd Edition, S.Chand& Co, 2004.
2. Djafar K. Mynbaev, Fiber Optic Communications Technology, Pearson, 2001.
3. John Gowar, Optical Communication Systems, 2nd Edition, PHI, 2004.

Web References:

1. https://onlinecourses.nptel.ac.in/noc18_ee28/
2. https://nptel.ac.in/courses/108104113/
3. https://nptel.ac.in/downloads/117101054/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

ADVANCED DIGITAL SIGNAL PROCESSING (ADSP)

VII Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL11	PE-IV	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Design FIR & IIR Filters& Compute DFT using FFT algorithms

CO2:Understand Multirate Signal Processing & its Structures

CO3:Understand the Linear Optimum Filter Structures & their Applications

CO4:Analyze the Performance of Parametric & Non Parametric Power Spectral Estimations

UNIT – I

Filter Design: Design of FIR filters – FIR Differentiators, FIR Hilbert Transformer. Design of Elleptic IIR filters
FFTAlgorithms: Radix-3, Radix-4 and composite Radix DIT and DIF algorithms, applications of DFT to real time DSP

UNIT – II

Multirate Digital Signal Processing: Introduction, Decimation by a Factor D, Interpolation bya Factor I, Sampling Rate Conversion by a Rational Factor I/D, Filter Design and Implementation for sampling rate Conversion Multistage Implementation of Sampling Rate Conversion, Applications of Mult irate Signal Processing, and Sampling Rate Conversion of Band pass Signals.

UNIT – III

Linear Prediction And Optimum Linear Filters*:* Innovations Representation of a Stationary Random Process, Forward and Backward linear prediction, Solution of the Normal Equations, Properties of linear prediction-Error Filter, AR Lattice and ARMA Lattice-Ladder Filters.

UNIT – IV

***Power Spectral Estimation*:** Estimation of Spectra from Finite Duration Observations of a signal, the Periodogram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Tukey methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods

UNIT – V

Parametric Method OfPower Spectrum Estimation: Parametric Methods for power spectrum estimation, Relationship between Auto-Correlation and Model Parameters, AR (Auto-Regressive) Process and Linear Prediction, Yule-Walker, Burg and Unconstrained Least Squares Methods, Sequential Estimation,Moving Average(MA) and ARMA Models Minimum Variance Method.

Text Books :

1. Proakis JG and Manolakis DG Digital Signal Processing Principles, Algorithms and Application,PHI.
2. Openheim AV & Schafer RW, Discrete Time Signal ProcessingPHI.

Reference Simulation Text Books :

1.Samuel D Stearns, –Digital Signal Processing with examples in Matlab. – CRC Press.

2. ES Gopi. –Algorithm collections for Digital Signal Processing Applications using Matlab, – Springer.

3. Taan S.Elali, –Discrete Systems and Digital Signal Processing with Matlab, – CRC Press,2005.

Web References:

1.www.educypedia.org

2. www.edutalks.org

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

LOW POWER VLSI (LPV)

<table>
<tr><td colspan="5">VII Semester: ECE</td><td colspan="4">Scheme:2017</td></tr>
<tr><td>Course Code</td><td>Course Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">ECEL12</td><td rowspan="2">PE-IV</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>TOTAL</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration: 2 Hrs</td><td colspan="4">End Exam Duration: 3 Hrs</td></tr>
<tr><td colspan="9">Course Outcomes: At the end of the course the student will be able to</td></tr>
<tr><td colspan="9">CO1: Comprehend different sources of power dissipation.</td></tr>
<tr><td colspan="9">CO2: Realize switched capacitance and arrive at ways to minimize.</td></tr>
<tr><td colspan="9">CO3: Analyze and minimize dynamic and static power consumption in VLSI circuits.</td></tr>
<tr><td colspan="9">CO4: Outline the working principles of adiabatic logic.</td></tr>
<tr><td colspan="9">CO5: Establish ways to minimize power in software design.</td></tr>
<tr><td colspan="9">UNIT-1</td></tr>
<tr><td colspan="9">Sources of Power Dissipation:
Short-Circuit Power Dissipation, Switching Power Dissipation, Glitching Power Dissipation, Leakage Power Dissipation; Power Sources- for low power circuits---chargeable and disposable batteries, Supply Voltage Scaling for Low Power:
Device Feature Size Scaling, Architectural-Level Approaches, Voltage Scaling Using High-Level Transformations, Multilevel Voltage Scaling, Challenges in MVS, Dynamic Voltage and Frequency Scaling, Adaptive Voltage Scaling, Subthreshold Logic Circuits</td></tr>
<tr><td colspan="9">UNIT-2</td></tr>
<tr><td colspan="9">Switched Capacitance Minimization:
System-Level Approach: Hardware–Software Codesign, Transmeta‘s Crusoe Processor, Bus Encoding, Clock Gating, Gated-Clock FSMs, FSM State Encoding, FSM Partitioning, Operand Isolation, Precomputation, Glitching Power Minimization, Logic Styles for Low Power: Static CMOS Logic, Dynamic CMOS Logic, PTL; Some Related Techniques for Dynamic Power Reduction</td></tr>
<tr><td colspan="9">UNIT-3</td></tr>
<tr><td colspan="9">VTCMOS Approach, Transistor Stacking, MTCMOS Approach, Power Gating, Isolation Strategy, Sleep transistor, State Retention Strategy, Dynamic V_{th} Scaling</td></tr>
<tr><td colspan="9">UNIT-4</td></tr>
<tr><td colspan="9">Adiabatic Charging, Adiabatic Amplification, Adiabatic Logic Gates, Pulsed Power Supply, Stepwise Charging Circuits</td></tr>
<tr><td colspan="9">UNIT-5</td></tr>
<tr><td colspan="9">Introduction, Machine-Independent Software Optimizations, Combining Loop Optimizations with DVFS:Loop Unrolling, Loop Tiling, Loop Permutation, Strength Reduction, Loop Fusion, Loop Peeling, Loop Un-switching</td></tr>
<tr><td colspan="9">Text Books:</td></tr>
<tr><td colspan="9">1. Ajit Pal, Low-Power VLSI Circuits and Systems, Springer,2015</td></tr>
<tr><td colspan="9">2. J. Rabaey, Low Power Design Essentials, 1st Edition, Springer, 2010</td></tr>
<tr><td colspan="9">Reference Books:</td></tr>
<tr><td colspan="9">1. Kaushik Roy and Sharat Prasad, Low-Power CMOS VLSI Circuit Design, Wiley Inter-science Publications, 2000</td></tr>
<tr><td colspan="9">2. Michael Keating, David Flynn, Robert Aitken, Alan Gibbons, Kaijian Shi,Low Power Methodology Manual for System-On-Chip Design,Springer,2007</td></tr>
</table>

3. Christian Piguet, *Low Power CMOS Circuits Technology, Logic Design and CAD Tools*, 1st Indian Reprint, CRC Press, 2010

Web References:

1. https://nptel.ac.in/courses/106105034/
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
3. www.ece.ucdavis.edu/~vojin/CLASSES/EEC280/

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks)covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any one question.

CELLULAR AND MOBILE COMMUNICATIONS (CMC)

VIII Semester :ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL13	PE-V	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the fundamental concepts of cellular& mobile communication and its Radiopropagation

CO2: Understand the cell site and mobileantennas.

CO3: Analyze various types of handoffs and analog and digital switchingequipment.

CO4: Analyze different ARQ techniques and multiple accessschemes.

CO5: Understand the GSM architecture, SS7 protocol model, AIN for mobilecommunication.

UNIT – I

Introduction:

Basic Cellular System, Operation of Cellular system, Hexagonal cells, Frequency reuse of channels, Co-channel interference reduction, Cell splitting.

***Cell Coverage for signal and traffic*:**

Incident, Reflection & Elevation angles, Point to point model, Path loss formula, propagation over water or flat Open Ares, Land-to mobile transmission, path loss from point to point prediction model, Mobile to Mobile propagation.

UNIT – II

Cell site Antennas & MobileAntennas:

Antenna at cell site and mobileantennas.

Frequency Management & Channel Assignment:

Frequency management, Frequency-spectrum utilization, Set-up channels,
Channel assignment to cell site & mobile units, Fixed & non-fixed channel assignment.

UNIT – III

Hand offs:

Why hand off (H.O), Types of H.O, Initiation of H.O, Delaying H.O, Forced H.O, Queuing H.O, Power difference H.O, Mobile assisted H.O, Soft H.O, Intersystem H.O.

Switching & Traffic:

Space & Time switching, Analog switching equipment for cellular mobile system, Cellular digital switching equipment, MTSO inter connections.

UNIT – IV

***Introduction to Digital Mobile Telephony*:**

Introduction to digital technology, ARQ techniques, Stop and wait ARQ, Selective reference mission with ARQ, Multiple access schemes.

UNIT – V

Digital Cellular System:

Global system for mobile communication (GSM), GSM architecture, layer modeling, Transmission, GSM channels & channel modes, Radio resources management, Mobility management, Communication management, Network management.

Intelligent Network for Wireless Communication*:*
Advanced intelligent network (AIN) & Its architecture, SS7 protocol model, AIN for mobile communication.

Text Books :

1. Lee William.C.Y, *Mobile Cellular Telecommunications Analog and Digital System*, Mc Graw Hill, 2nd Edition.
2. T.S.Rappaport, *Wireless communications*, Pearson Ed, 2nd Edition.

Reference Books :

1. Pandya Raj, *Mobile and Personal Communication Services and Systems*, PHI, 2nd Edition, March, 2004.
2. Jochen Schiller H, *Mobile Communications*, Pearson Ed, *2nd Edition*, 2008.

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

VLSI DESIGN FOR TESTABILITY (VDFT)

<table>
<tr><td colspan="5">VIII Semester: ECE</td><td colspan="4">Scheme: 2017</td></tr>
<tr><td>Course Code</td><td>Course Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">ECEL14</td><td rowspan="2">PE -V</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>TOTAL</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Sessional Exam Duration: 2 Hrs</td><td colspan="4">End Exam Duration: 3 Hrs</td></tr>
<tr><td colspan="9">Course Outcomes: At the end of the course the student will be able to</td></tr>
<tr><td colspan="9">CO1:Understand all the levels of testing done in VLSI circuits</td></tr>
<tr><td colspan="9">CO2:Understand the DFT principles in VLSI circuits</td></tr>
<tr><td colspan="9">CO3:Understand logic and fault simulation in VLSI circuits</td></tr>
<tr><td colspan="9">CO4:Understand Memory Testing and Built-In Self-Test</td></tr>
<tr><td colspan="9">CO5: Understand Analog Testing</td></tr>
<tr><td colspan="9">UNIT-1</td></tr>
<tr><td colspan="9">Introduction to Testing: Importance of Testing, Testing During the VLSI Lifecycle, Challenges in VLSI Testing- Challenges in VLSI Testing, Fault Models; Levels of Abstraction in VLSI Testing, Historical Review of VLSI Test Technology</td></tr>
<tr><td colspan="9">UNIT-2</td></tr>
<tr><td colspan="9">Design for Testability: Introduction, Testability Analysis----SCOAP Testability Analysis, Probability-Based Testability Analysis, Simulation-Based Testability Analysis; Design for Testability Basics--- Ad Hoc Approach, Structured Approach; Scan Cell Designs--Muxed-D Scan Cell, Clocked-Scan Cell, LSSD Scan Cell; Scan Architectures --- Full-Scan Design, Partial-Scan Design, Random-Access Scan Design; Scan Design Rules, Scan Design Flow diagram and brief description of each stages only, RTL Design for Testability</td></tr>
<tr><td colspan="9">UNIT-3</td></tr>
<tr><td colspan="9">Logic and Fault Simulation: Logic Simulation for Design Verification, Fault Simulation for Test and Diagnosis, Simulation Models--- Gate-Level Network, Logic Symbols, Logic Element Evaluation, Timing Models; Logic Simulation, Fault Simulation--- serial, parallel, deductive, concurrent and differential fault simulation; fault detection, comparison of Fault Simulation Techniques, Alternatives to Fault Simulation</td></tr>
<tr><td colspan="9">UNIT-4</td></tr>
<tr><td colspan="9">Memory Testing and Built-In Self-Test:RAM Functional Fault Models and Test Algorithms:RAM Functional Fault Models, RAM Dynamic Faults, Functional Test Patterns and Algorithms, March Tests, Comparison of RAM Test Patterns, Word-Oriented Memory, Multi-Port Memory, Memory Built-In Self-Test:RAM Specification and BIST Design Strategy,BIST Architecturesand Functions, BIST Implementation</td></tr>
<tr><td colspan="9">UNIT-5</td></tr>
<tr><td colspan="9">Analog Testing:Analog Circuit Properties:Continuous Signals,Large Range of Circuits, Nonlinear Characteristics, Feedback Ambiguity, Complicated Cause–Effect Relationship, Absence of Suitable Fault Model, Analog Defect Mechanisms and Fault Models:Hard Faults, Soft Faults, Analog Circuit Testing: Analog Test Approaches, Analog Test Waveforms, DC Parametric Testing, AC Parametric Testing</td></tr>
<tr><td colspan="9">Text Books:</td></tr>
<tr><td colspan="9">1. Laung-Terng Wang, Cheng-Wen Wu, Xiaoqing Wen, –VLSI Test Principles andArchitectures: Design for Testability‖, 1st Edition, Morgan Kaufmann, 2006.</td></tr>
</table>

Reference Books:

1. 1.M.L.Bushnell,V.D.Agrawal,–EssentialsofElectronicTesting forDigital,Memoryand Mixed Signal VLSI Circuits‖, Kluwer AcademicPublishers,2000
2. M.Abramovici, M.A.Breuer and A.D. Friedman, –Digital systems and Testable Design‖,Jaico Publishing House,2002
3. Parag K. Lala, –Digital Circuits Testing and Testability‖, Academic Press Inc, 1997

Web References:

1.http://booksite.elsevier.com/9780123705976/

2.https://onlinecourses.nptel.ac.in/noc17_ec02/preview

3.http://nptel.ac.in/courses/106103116/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

RADAR AND SATELLITE SYSTEMS (RSS)

VIII Semester : ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL15	PE-V	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1:Understand the basic concepts of Radar system.

CO2: Understand the basic operation of MTI and Pulse Doppler radar systems.

CO3: Analyze suitable radar tracking methods.

CO4: Understand the basic concepts of Satellite communication system

CO5: Understand the applications of satellite communication systems

UNIT – I

Basic Radar and Radar Equation

Introduction ,Basic Radar ,Radar Frequency bands , Simple form of Radar equation ,Radar Frequencies , Probabilities of detection and false alarm , Integration of Radar pulses , Radar cross-section of Targets ,Radar cross-section fluctuations , Transmitter Power , PRF , Antenna Parameters and System losses

UNIT – II

MTI and Pulse Doppler Radar

Introduction to Doppler and MTI Radar , Delay-line cancellers , Blind speeds , Staggered PRF , Doppler filter banks , Digital MTI performance, Limitations to MTI performance

Tracking with Radar , Mono-pulse, conical scan and sequential lobbing , Limitations to Tracking accuracy , Tracking in range, angle and Doppler , Comparison of trackers, Doppler effect, CW radar, FM CW radar, Multiple frequency CW radar.

UNIT – III

Tracking Radar:

Tracking with radar, Sequential lobbing, Conical scan, Monopulse amplitude Comparison and phase comparison tracking radars.

Radar Receivers: Radar receiver, Noise figure, Low noise front ends**,** Duplexers and receiver protectors.

Satellite Orbits & Space Segment

Kepler‘s laws, Newton‘s laws, Orbital parameters, Orbital perturbations, Station keeping, geostationary and Non-geostationary orbits

Space craft technology, Structure, Primary power, Attitude and orbit control, Thermal control and propulsion, communication payload and supporting subsystems, Telemetry, Tracking and Command, Uplink and downlink analysis and design, Link Budget, E/Ncalculation

UNIT – IV

Earth Segment and Satellite Access:

Transmit – Receive Earth Stations – EIRP – Transmission Losses – Feeder Losses – Antenna misalignment losses – Atmospheric & Ionospheric losses – Link power budget – System Noise, Antenna noise, C/N ratio, Digital Video broadcast.

UNIT – V

Satellite Applications

Intelsat series, INSAT, VSAT, Mobile Satellite Services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System, Direct Broadcast Satellites (DBS) – Direct to Home Broadcast (DTH), Digital Audio Broadcast (DAB).

Specialized Services: e-mail, Video Conferencing, Internet

Text Books :

1. M.I. Skolnik, Introduction Radar Systems, Second Edition, Mc Graw Hill Book Co., 1981.
2. M.I.Skolnik, *Introduction to Radar Systems*, 3rd Edition, TMH, 2008.
3. F.E. Terman, Radio Engineering, Fourth Edition Mc Graw Hill Book Co. 1955 .
4. Dennis Roddy, *Satellite Communications*, 4th Edition, McGraw- Hill International Edition, 2006.
5. Sapna Katiyar, *Satellite Communications*, 3rd Edition, S.K. Kataria & Sons, 2013.
6. Dennis Roddy, *Satellite Communications*, 4th Edition, McGraw- Hill International Edition, 2006.

Reference Books :

1. Kulkarni M, *Microwave and Radar Engineering*, 4th Edition, Umesh Pub, 2010.
2. Simon Kingsley & Shaun Quegan, Understanding RADAR Systems, McGraw Hill, 1993.
3. Timothy Pratt, Charles Bostian and Jeremy Allnutt , *Satellite Communications*, 2nd Edition, John Wiley & Sons, 2003.
4. W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, *Satellite Communication Systems Engineering*, 2nd Ed., Pearson Education, 2007.

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

WIRELESS COMMUNICATIONS (WCM)

VIII Semester :ECE						Scheme : 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL16	PE-VI	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the characteristics of Mobile Radiopropagation.

CO2: Analyze factors influencing small scale Mutipathpropagation.

CO3: Understand the parameters of wireless multipathchannels.

CO4: Analyze the operation of Equalizers and Diversitytechniques.

CO5: Understand the multicarrier modulation and technical challengesinvolved.

UNIT – I

Mobile Radio Propagation:

Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge diffraction, Scattering.

UNIT – II

Small Scale fading in Mobile Radio Propagation:

Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum, Frequency domain channelsounding.

UNIT – III

Parameters of Wireless Multipath Channels:

Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects due to Multipath Time Delay Spread, Rayleigh & Ricean Distributions, Fading effects due to Doppler Spread, Statistical Models for multipath Fading Channels-Clarke‘s model for flat fading, Spectral shape due to Doppler spread in Clarke‘s model.

UNIT – IV

Equalization and Diversity:

Introduction, Fundamentals of Equalization, Equalizers in a communication Receiver, Linear Equalizers, Non-Linear Equalization, Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square (LMS) Algorithm, Recursive Least Squares(RLS) Algorithm.

Diversity Techniques-Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKEReceiver.

UNIT – V

Multicarrier modulation :

Data transmission using multiple carriers, Multi carrier modulation with overlapping sub-channels, Mitigation of subcarrier Fading- Coding with Interleaving, Pre-coding, Adaptive Loading, Frequency Equalization, Discrete implementation of Multicarrier modulation- The cyclic prefix, Orthogonal Frequency division multiplexing (OFDM), Matrix representation of OFDM, Challenges in Multicarrier systems- Peak-to-Average power ratio, Frequency and timing offsets.

Text Books :

1.T.S.Rappaport, –*Wireless Communications – Principles & Practice"*, 2nd Edition, PHI.

2. Andrea Goldsmith, –*Wireless Communications"*, 2nd Edition,Cambridge University Press, 2009.

Reference Books :

1.William Stallings, –*Wireless communications & Networks"*,2nd Edition, Pearson Education.

2.William C.Y. Lee, –*Mobile Cellular Telecommunications"*, 2nd Edition, McGraw-Hill.

3. Simon Haykin, –*Modern wireless communications*|, 1st edition, Pearson, 2004.

Web References :

1. https://nptel.ac.in/courses/117102062/
2. https://www.youtube.com/watch?v=4R1qHE0E8lE
3. https://www.youtube.com/watch?v=XUXmfrbNJns

Question Paper Pattern:

Sessional Exam:

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End Exam:

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FPGAs &ASIC ARCHITECTURES AND APPLICATIONS (FPGA)

VIII Semester: ECE						Scheme:2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECEL17	PE-VI	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: Understand and differentiate various types of FPGAs available in the commercial world.

CO2: Explore Xilinx FPGA from basic operation to advanced features.

CO3: Dissect FPGA design flow and the choose EDA tools suitable for design and verification.

CO4: Reason the FPGA design methodologies for low power.

CO5: Grasp the advanced topics viz CGRA, asynchronous FPGAs, 3-D FPGAs and LVDS.

UNIT-1

Basics Of FPGA:

History of FPGAs, Position of FPGA, Components of an FPGA, Programming Technology: Flash Memory, Antifuse Technology, Static Memory Technology, Summary of Programming Technology. Logic Circuit Representation of FPGA: Circuit Implementation on FPGA, Logical Expression by Product Term, Logical Expression by Lookup Table, Structure of Lookup Table, Logical Expression by other Methods.

UNIT-2

FPGA Structure

Logic Block, Logic Cluster, Adaptive LUT Routing, Switch Block, Connection Block,I/O Block,DSP Block, Hard Macros, Embedded Memory, Configuration Chain, PLL and DLL

UNIT-3

Design Flow And Design Tools

Design Flow, Design Flow by HDL, High Level Synthesis Design, Intellectual Property (IP) Based Design, Design with Processor

UNIT-4

Design Methodology

FPGA Design Flow, Technology Mapping, Clustering, Place and Route, Low Power Design Tools, Summary.

UNIT-5

Advanced Devices And Architectures

Coarse-Grained Reconfigurable Architecture, Asynchronous FPGA, 3D FPGA, High-Speed Serial I/O.

Text Books:

1. Hideharu Amano. 2018.*Principles and Structures of FPGAs.*Springer, Singapore.
2. Ian Grout. 2008. *Digital Systems Design with FPGAs and CPLDs*. Newnes, Newton, MA, USA.

Reference Books:

1.CemUnsalan,Bora Tar. 2017. *Digital System Design with FPGA: Implementation Using Verilog and VHDL*, McGraw Hill Education India.
2. Michael John Sebastian Smith. 2008. *Application-Specific Integrated Circuits* (1st ed.). Addison-Wesley Professional.

3. Pak K Chan&Samiha Mourad. 1994. *Digital design using field programmable gate arrays*. PTR Prentice Hall,Englewood Cliffs, N.J.

Web References:

1. https://nptel.ac.in/courses/117108040/
2. https://nptel.ac.in/courses/108105113/45

Question Paper Pattern:

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End Exam:

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ADAPTIVE SIGNAL PROCESSING (ASP)

VIII Semester :ECE					Scheme:2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
ECEL18	PE-VI	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Sessional Exam Duration:2Hrs					End Exam Duration:3Hrs			

Course Outcomes: On completion of this subject, the student will be able to:

CO1: Understand the fundamentals of Adaptive Filters

CO2: Analyze the concept of Discrete time random process

CO3: Understand linear predictors and Lattice Predictors of Wiener Filter.

CO4: Analyze Linear FIR Adaptive Filters using steepest descent and Least square approaches.

CO5: Analyze the Linear Adaptive filters using kalman Filtering Algorithm.

UNIT – I

Adaptive filters, Filter structures, Approaches to the development of Adaptive Filter theory, Applications .

UNIT - II

Stochastic Process, Stationary Process, Wide Sense Stationary process, Strict Sense Stationary Process Spectrum Analysis, Eigen Analysis.

UNIT - III

Weiner Filters – Linear Predictors, Lattice predictors. Method of steepest descent, Mean squared error, Least mean square Adaptive algorithm, Gradient Adaptive lattice Algorithm.

UNIT - IV

Standard Recursive Least squares estimation, comparison of RLS and LMS algorithms. Fast recursive algorithm, Adaptive Forward and Backward linear perdition. Fast Transversal Filters.

UNIT - V

Convergence and Stability Analyses.
Convergence analysis of the LMS algorithm, Learning curve and mean square error behavior, Weight error correlation matrix, Dynamics of the steady state mean square error(mse), Misadjustment and stability of excess mse.

Text Books:

1. Bernard Widrow and Samuel D. Stearns**, "Adaptive Signal Processing"**, Pearson Education (Asia) Pte. Ltd., 2001.

2. Simon Haykin, **"Adaptive Filters"**, Pearson Education (Asia) Pte. Ltd, 4th edition, 2002.

3.J.G. Proakis, C.M. Rader, F. Ling, C.L. Nikias, M. Moonen and I.K. Proudler, "Algorithms for Statistical Signal Processing‖

4. "Adaptive Filter Theory" by S. Haykin, Prentice Hall, Englewood Cliffs, NJ,1991 (end Ed.).

5. "Adaptive Filters – Theory and Applications", by B. Farhang-Boroujeny,John Wiley and Sons, 1999.

Reference Text Books:

1. Monson H. Hayes, **"Statistical Digital Signal Processing and Modelling"**, John Wiley & Sons (Asia) Pte. Ltd., 2002.

2. Dimitris G. Manolakis, Vinay K. Ingle, and Stephen M. Kogon, **"Statistical and Adaptive Signal Processing: Spectral Estimation, Signal Modelling, Adaptive Filtering and Array Processing"**, McGraw- Hill International Edition, 2000.

3.Adaptive Signal Processing - **Bernard Widrow, Samuel D. Strearns**, 2005, PE

Web References:
1.nptel.ac.in/syllabus/syllabus_pdf/117105026.pdf
2.https://books.google.co.in/books?isbn=0470575743
3.https://www.spsc.tugraz.at/courses/adaptive
Question Paper Pattern:
Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each. **End Exam:** Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain subquestions. i.e. there will be two questions from each unit and the student should answer any one question.

ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS (AIES)

V Semester: B.Tech					Scheme: 2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
OE301	Open Elective - 1	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration:2 Hrs					End Exam Duration:3 Hrs			

Course Outcomes: At the end of the course students will be able to

CO1: Understand how to formulate an efficient problem state space for a problem

CO2: Discuss how search strategies will find solutions to problems by systematically generating new states and testing them against goals

CO3: Apply Hill-climbing, simulated annealing, Local Beam Search, Genetic Algorithms (Local search problems) for Agent‘s Problems

CO4: Describes how to solve unpredictability, contingencies of agent‘s problem-solving process, in which the agents' GAME goals are in conflict

CO5: Understand the features and working of Expert System.

UNIT–I

Introduction: What Is AI?, The Foundations of Artificial Intelligence

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, And the Structure of Agents.

Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions

UNIT–II

***Uninformed Search Strategies*:** BFS, DFS, Depth –limited search, IDA, Bidirectional search

Informed (Heuristic) Search Strategies- Greedy best-first search, A* search, Memory-bounded heuristic search, Learning to search better. Heuristic Functions.

UNIT–III

Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search In Continuous Spaces, Searching With Partial Observations. Searching with Nondeterministic Actions

UNIT–IV

Adversarial Search: Games, Optimal Decisions In Games, Alpha—Beta Pruning

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation: Inference InCsps, Backtracking Search For Csps, Local Search For Csps, The Structure Of Problems

UNIT–V

Introduction to Expert System: What are Expert Systems, Features of Expert system, Features of good expert system, Role of human in Expert system, Expert system organization, Difference between expert system and conventional program, Basic activities of expert system and the areas in which they solve problems, Prospector system features, working.

Text Books:

1. Stuart Russell and Peter Norvig, −Artificial Intelligence: A Modern Approach‖, Third Edition, 2010. PearsonEducation.
2. Donald A.Water man,‖ A Guide to expert systems‖, Addison Wesley publishing company.

Reference Books:

1. Elaine Richie Kevin Knight [2008], [3rd Edition], Artificial Intelligence, TMH

Web References:

1. https://onlinecourses.nptel.ac.in/noc18_cs51
2. https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/
3. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_expert_systems.htm

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any one question.

INTRODUCTION TO INFORMATION SYSTEMS (IIS)

V Semester: B.Tech						Scheme: 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
OE302	Open Elective -1	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration:2 Hrs						End Exam Duration:3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Understand the concepts of Computer architecture and functionalities of System software

CO2: Understand the page replacement and CPU Scheduling Algorithms

CO3: Understand the phases of software development life cycle and process models.

CO4: Design ER model for real life scenarios

CO5: Apply SQL commands to create, update, modify and retrieve data from the data bases.

CO6: Apply normalization techniques to normalize the database.

UNIT– I

Fundamentals of Computers & Computer Architecture:

Introduction, Organization of a smallcomputer, Central Processing Unit, Execution cycle, Instruction categories, measure of CPU performance, Memory, Input/output devices, BUS, addressing modes

System Software:

Assemblers, Loaders and linkers, Compilers and interpreters.

UNIT– II

Operating System:

Introduction, Memory management schemes, Page replacement algorithms, Process management,CPU schedulingalgorithms.

Softwareengineering:

Software engineering: Introduction to Software engineering, Life cycle of a software project, software Development models.

UNIT– III

Relational Database Management System:

Introduction to DBMS, the database technology, datamodels, Database Users.

***Entity Relationship (E-R) Modelling*:**

Introduction, Notations, Modelling E-R Diagrams, CaseStudies, Merits and Demerits of E-R modelling.

UNIT– IV

Structured Query Language (SQL):

Introductionto SQL, Data types, Data Definition languagecommands, Data Manipulation Language Commands and Data control Language Commands, Candidate Key, Primary key, Foreign key, Selec Clause, Where Clause, Logical Connectives – AND, OR, Range Search, Pattern Matching, Order By, Group By, Set Operations – Union, Intersect and Minus, Aggregate Functions,JoinOperations.

UNIT– V

Normalization:

Introduction, Need for Normalization, Process of Normalization, Types of NormalForms (1 NF, 2 NF, 3 NF & BCNF), Merits and Demerits of Normalization.

Text Books:

1. Campus Connect Foundation Program – Computer Hardware and System Software Concepts, Programming Fundamentals- Vol. – 1, INFOSYS**.**

2.Campus Connect Foundation Program – Relational Database Management System, Client Server Concepts, Introduction to Web Technologies - Vol. – 4, INFOSYS

3.Henry F. Korth& Abraham Silberschatz, - Data Base System Concepts, 5th Edition, 2005, Mc Graw ill

Reference Books:

1. M. Morris Mano [2011], [3 rd Edition], Computer system architecture, Pearson Education, 2011
2. Sommerville [2008], [7th Edition], Software Engineering, Pearson education.
3. Raghu Ramakrishna and Johannes Gehrke [2003], [3rd Edition], Data Base Management Systems, TATA Mc GrawHil
4. Tanenbaum [2000], Modern Operating System, Pearson Education.

Web References:

1. https://www.w3schools.com/sql/
2. https://www.geeksforgeeks.org/dbms/
3. https://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks,covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No.1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER / OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

WEB DEVELOPMENT PROGRAMMING (WDP)

V Semester: B.Tech						Scheme: 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
OE303	Open Elective - 1	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Understand the fundamental concepts of web designing.

CO2: Design a static web page using HTML tags and attributes.

CO3: Develop web pages using HTML and Cascading Styles sheets.

CO4: Understand the concepts of server side programming.

CO5: Create dynamic and interactive websites using database connection.

UNIT– I

Web Technology Fundamentals: Introduction to the Web, Web servers and Clients, Resources, URL and itsAnatomy, Message Format, Persistent and Non-persistent connections, Web Caching, Proxy, Java and the Net, Java Network Classes and Interfaces, Looking up Internet Address.

UNIT– II

HTML: HTML and its Flavors, HTML basics, Elements, Attributes and Tags, Basic Tags,Advanced Tags, Frames, Images, Meta tag, Planning of Web page, Model and Structure for a Website, Designing Web pages, Multimedia content.

UNIT– III

Cascading style sheets: Advantages, Adding CSS, Browser compatibility, CSS and page layout,Selectors.

UNIT– IV

Server side programming: Server-side Java, Advantages over Applets, Servlet alternatives, Servlet strengths, Servlet architecture, Servlet life cycle, Generic and HTTP Servelet, First servlet, Passing parameters to servlets, Retrieving parameters, Server-side include, Cookies, Filters, Problems with servlet, Security issues, JSP and HTTP, JSP Engines, How JSP works, JSP and Servlet, Anatomy of a JSP page, JSP syntax, JSPcomponents.

UNIT– V

Database Connectivity: Database connectivity, JDBC drivers, Basic steps, Loading a driver, Making a connection, Execute and SQL statement, SQL statements, Retrieving the result, Getting database information.

Text Books :

1. UtamK.Roy, –Web Technologies", Oxford Higher Education, 1st Edition, Seventh Impression.
2. K.L.James, –The Internet- A User Guide", 2nd Edition, PHI Publications.

Reference Books :

1. Introduction to Java Programming‖, Y.Daniel Liang, 6th Edition, Pearson Education, 2007
2. Web Technologies Srinivasan, Pearson Education, 2012.
3. Kognet Learning Solutions inc.,‖HTML5 in Simple Steps‖, DreamTech press.
4. Java EE 5 for Beginners, Ivan Bayross, Sharanam Shah, Cynthia Bayrossand. Vaishalishai,SPD.

Web References:

1. https://www.tutorialspoint.com/html/
2. https://www.tutorialspoint.com/css/
3. https://www.javatpoint.com/java-tutorial

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No 1which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions i.e there will be two questions from each unit and the student should answer any one question.

INTRODUCTION TO CYBER SECURITY(ICS)

V Semester: B.Tech						Scheme: 2017		
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	EndExam	TOTAL
OE304	Open Elective -1	3	0	0	3	40	60	100
Sessional ExamDuration:2 Hrs						End Exam Duration:3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Cyber Security architecture principles

CO2: Identifying different classes of attacks

CO3: Understand about cybercrime with mobile and wireless devices

CO4: Understand about the tools and methods used in cybercrime.

CO5: Understand about cyber security and social media marketing.

UNIT– I

Introduction to Cybercrime

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT– II

Cyber offenses

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT– III

Cybercrime Mobile and Wireless Devices

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile,Organizational Security Policies and Measures in Mobile Computing Era,Laptops.

UNIT– IV

Tools and Methods Used in Cybercrime

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks,Phishing.

UNIT– V

Cyber Security:

Organizational Implications Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing**:** Security Risks and Perils for Organizations, Social Computing and the associated challenges forOrganizations.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning.

Reference Books:

1. Information Security, Mark Rhodes, Ousley,MGH.
2. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press

Web References:

1.https://www.tutorialspoint.com/fundamentals_of_science_and_technology/cyber_crime_and_cyber_security.htm

Question Paper Pattern:

Sessional Exam

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second sessional exam. Question No1which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions.i.e. there will be two questions from each unit and the student should answer any one question.

INTERNET OF THINGS (IOT)

V Semester: B.Tech						Scheme: 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
OE305	Open Elective - 1	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes:At the end of the course the student will be able to

CO1: Understand the basic knowledge of Internet of things and its design

CO2: Understand the purpose of sensors and Actuators in IoT

CO3: Analyze Various IoT Protocols

CO4: Design IoT Projects Using Arduino

CO5: Understand Raspberry-Pi Processor and Raspbian Operating Systems

UNIT – I

Introduction to IoT:
Definition and Characteristics of IoT, Physical Design and Logical Design, IoT Enabling Technologies, IoT Levels and Deployment Templates, IoT Vs M2M

UNIT – II

Sensing and Actuation:
Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT

UNIT – III

Wireless Technologies and Data Transmission for IoT:
Wi-Max, Wi-Fi (802.11), Bluetooth/Bluetooth smart,Zigbee/Zigbee smart, Cellular, NFC,Serial Transmission, RS-232, RS-485, I2C Inter-Integrated Circuit, Ethernet, CAN bus, USB, Firewall, Serial ATA, Parallel Transmission.

UNIT – IV

Building IoT with Arduino:Arduino IDE, Programming of Arduino, Interfacing LED, switch, potentiometer, Sensors, LCD, Bluetooth, Wi-Fi, GPS, RFID with Arduino

UNIT –V

Raspberry Pi:
Linux basics, Linux File system, Navigating the File system, Text Editors, Accessing Files, Permissions, Processes, Linux Graphic user Interface, Raspberry Pi Processor, Raspberry Pi Vs Arduino, Operating system benefits, Raspberry Pi Set up, Configuration.

Text Books:

1. ArsheepBahga , Vijay Madisetti ,Internet of Things: A Hands-On Approach Paperback,2015
2. RajkumarBhuyya,Internet of Things: Principles and Paradigms,2016
3. Adeel Javed, Building Arduino Projects for the Internet ofThings,Apress,2016
4. Wolfram Donat, Learn Raspberry-Pi withPython,Apress,2016

Reference Books:

1. Charles Bell,Beginning Sensor Networks with Arduino and Raspberry-Pi,Apress,2016
2. AndrianMcEwen , Hakim Casimally,Designing of Internet of Things, John Wiley,2014
3. Warren Gay,Masteringthe Raspberry-Pi,Apress,2016

Web References:

1. https://nptel.ac.in/courses/106105166/
2. https://onlinecourses.nptel.ac.in/noc17_cs22/course
3. https://nptel.ac.in/courses/108108098/4
4. https://onlinecourses.nptel.ac.in/noc19_ee28

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains hree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

NANO TECHNOLOGY (NNT)

V Semester: B.Tech						Scheme: 2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
OE306	Open Elective - 1	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: Acquiresomeofthefundamentalprinciplesbehindnanotechnologyandnanomaterialsandtheir vital role in novel sensing properties andapplications.

CO2: Understand the fabrication, characterization, and manipulation of nanomaterials,Nanosensors and introduction tosensors.

CO3: Understand about metal nanoparticle based sensors and nanowire basedsensors.

CO4: Understand about sensors based on nanostructures of metaloxides.

UNIT – I

Introduction to Nanotechnology:

Definition of nanotechnology; main features of nanomaterials; types of nanostructures (0D, 1D, and 2D structures); nanocomposites; and mainchemical/physical/electrical/optical properties of nanomaterials.Methods for characterizing the nanomaterials: Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and spectroscopy- and spectrometry-based surface analysis techniques. Fabrication of sensors by bottom-up and top-down approaches; self-assembly of nanostructures; and examples for nanotechnology application

UNIT – II

Introduction to Sensors' Science and Technology:

Definition of sensors; main elements of sensors; similarities between living organisms and artificial sensors; working mechanism of physical sensation (seeing, hearing, and feeling) and chemical sensation (smelling and tasting); the parameters used for characterizing the performance of sensors: accuracy, precision, sensitivity, detection limit, dynamic range, selectivity, linearity, resolution, response time, hysteresis, and life cycle

UNIT – III

Metal nanoparticle-based Sensors:

Definition of nanoparticle; features of nanoparticles; and production of nanoparticles by physical approach (laser ablation) and chemical approaches (Brust method, seed-mediated growth, etc.).Quantum Dot Sensors. Definition of quantum dot; fabrication techniques of quantum dots; Macroscopic and microscopic photoluminescence measurements; applications of quantum dots as multimodal contrast agents in bioimaging; and application of quantum dots as biosensors.

UNIT – IV

Nanowire-based Sensors:

Definition of nanowires; features of nanowires; fabrication of individual nanowire by top-down approaches and bottom-up approaches; and fabrication of nanowire arrays (fluidic channel, blown bubble film, contact printing, spray coating, etc.).Carbon Nanotubes-based Sensors: Definition of carbon nanotube; features of carbon nanotubes; synthesis of carbon nanotubes; fabrication and working principles of sensors based on individual carbon nanotube; fabrication and working principles of sensors based on random array of carbon nanotubes.

UNIT – V

Sensors Based on Nanostructures of Metal Oxide:

Synthesis of metal oxide structures by dry and wet methods; types of metal oxide gas sensors (0D, 1D, and

2D); defect chemistry of the metal oxide sensors; sensing mechanism of metal-oxide gas sensors; and porous metal-oxide structures for improved sensing applications.

Text Books :

1. Jiří Janata, Principles of Chemical Sensors, Springer, 2d Edition (1989). 2. Roger George Jackson, Novel Sensors and Sensing, CRC Press (2004).

Reference Books :

1. Florinel-Gabriel Banica, Chemical Sensors and Biosensors: Fundamentals and Applications, John Wiley and Sons (2012).
2. Ramsden Jeremy, Nanotechnology, an Introduction. Elsevier(2011).

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 markseach

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS(RSGIS)

VSemester :B.Tech						Scheme : 2017		
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	Total
OE307	Open Elective - 1	2	1	-	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration : 3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Understand the concept of electromagnetic radiation and its interaction with earth's surface

CO2: Understand air borne and space borne platforms, space imaging satellites of different Countries.

CO3: Understand the image processing techniques and applications of remote sensing.

CO4: Understand the concept of GIS and organization of GIS data structures.

CO5: Understand primary and secondary methods of capturing spatial and attribute data.

UNIT - I

Introduction to Remote Sensing: Concept and Scope of Remote Sensing:Definition – Physics of Remote Sensing – Electro Magnetic Radiation (EMR), Process and Characteristics of Remote Sensing System – Energy Interaction with the atmosphere and Earth Surface Features – Vegetation, soils, water– Spectral Reflectance Curves, atmospheric windows, Advantages and limitations of remote sensing.

UNIT - II

Platforms and Sensors: Remote Sensing Systems: Platforms: Introduction – Types – Satellites and orbits,Passive and Active sensors– Spatial, spectral, radiometric and temporal resolution of satellites, Whiskbroomand Push-broom scanners, Multi-band concepts and False Color Composites - Some remote sensing satellites and their features.

UNIT - III

Image Processing Techniques and Remote Sensing Applications: Digital Image Processing: Image enhancement – Contrast stretch, Spatial filtering and edge enhancement; Classification – Supervised and unsupervised classification – Visual image interpretationtechniques.

Remote Sensing Applications - Applications in land use and land cover analysis - Mapping of forest and agriculture -Watershed management - Drought Assessment - Environmental modeling and other applications.

UNIT - IV

Geographic Information System: Basic Concepts*:* Definition - Components - Functions of GIS - Areas of GIS application - Advantages and Limitations of GIS - Information Organization and Data Structures – Raster and Vector data structures - Data file organization and formats - Data Base ManagementSystems.

UNIT - V

GIS Data Input & Editing: Method of Spatial and Attribute data capture– Primary and Secondarydigitization and scanning method - Techniques and procedure for digitizing, Topology– Errors of Digitization and rectification - Re-projection - Transformation and Generalization - Edge matching and Rubber sheeting - Proximity - Buffering and overlay.

Text Books :

1. M. Anji Reddy, Text Book of Remote Sensing and Geographic Information System, BS Publication.

2. Lo C.P. & Yeung A.K.W., (2004), Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi.

3. Thomas Lillesand, Ralph W Kiefer and Jonathan Chipman –Remote Sensing and Image Interpretation‖, John Wiley & Sons, India

Reference Books :

1. B.Bhatta, *Remote sensing and Geographic Information System*, Oxford Publications.
2. Siddiqui, M.A.(2006), *Introduction to Geographical Information System*, ShardaPustakBhavan, Allahabad.
3. Curran, Paul J (1985), *Principles of Remote Sensing*, Longman, London.
4. Floyd F Sabins Jr., *Remote Sensing Principles and Interpretation*, Freeman and Co., San Franscisco.

Web References:

1. www.nptel.ac.in/courses

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No. 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

End Exam:

Question paper contains Six questions. Question 1 contains 5 short Answer questions each of 2 marks (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions i.e. there will be two questions from each unit and the student should answer any one question.

OPTIMIZATION TECHNIQUES (OT)

VI Semester:	B.Tech				Scheme: 2017			
Course Code	Category	Hours / Week			Credits	Maximum Marks		
OE308	Open Elective - 1	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	-	-	3	40	60	100
Sessional Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes: At the end of the course students will be able to

CO 1:	Understand basics of operations research, linear programming models
CO 2:	Solve transportation related problems
CO 3:	Solve assignment problems and sequencing problems
CO 4:	Solve queuing and game theory related problems
CO 5:	Solve project management problems

UNIT – I

Introduction: Definition, Significance of Operations Research, Models in Operations Research, Application Areas of Operations Research

Linear Programming: Model Formulation, Graphical solution of L.P.P, Slack, Surplus and Artificial variables, Simplex method, Big M method, Degeneracy in L.P.P, Duality Concept

UNIT –II

Transportation Problems: IntroductionBalanced and unbalanced Transportation problems, Initial basic feasible solution using N-W corner rule, least cost method and Vogel‘s approximation method, Optimal Solution (MODI method), Degeneracy in Transportation Problem

UNIT –III

Assignment Problems: Introduction, The Assignment Algorithm (Hungarian Assignment method), Balanced and Unbalanced Assignment Problems, Travelling Salesman Problem as an Assignment Problem

Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing _n‘ jobs through m machines, Processing 2 jobs through m machines

UNIT –IV

Game Theory: Definitions and Terminology, Two Person Zero Sum Games, Pure Strategy Games (with Saddle Point), Principle of Dominance, Solution for Mixed Strategy Games (Games without Saddle Point) Graphicalmethod

Queuing Theory: Introduction, single channel - poisson arrivals - exponential service times with infinite population, and Multi-channel - poisson arrivals - Exponential service times withinfinite population**.**

UNIT – V

Project Management: Phases of project management, guidelines for network construction, critical path, forward and backward pass, floats and their significance, crashing for optimum duration.

Text Books:

1. Hamdy, A. Taha, Operations Research-An Introduction, Prentice Hall of India Pvt. Ltd

2. S.D. Sharma, Operations Research, Kedarnath, Ramnath& Co., Meerut,

3. R. Paneer Selvam, Operations Research , PHI Learning Pvt. Ltd., New Delhi

Reference Books:

1. Hillier / Lieberman, Introduction to Operations Research , Tata McGraw Hill Edition

2. J.K. Sharma, Operations Research-Problems and Solutions, Macmillan India Ltd

3. Billy E Gillett, Introduction to Operations Research A Computer Oriented Algorithmic Approach, Tata McGraw Hill Edition

4. V.K. Kapoor, Operation research

Question Paper Pattern:

Sessional Exam

The question paper for Sessional examination is for 30 marks, covering half of the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

RENEWABLE ENERGY SYSTEMS (RES)

V Semester: B.Tech Scheme: 2017								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
OE309	Open Elective - 1	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
		3	**0**	**0**	**3**	**40**	**60**	**100**
Sessional Exam Duration: 2 Hrs					**End Exam Duration: 3 Hrs**			

Course Outcomes: At the end of the course the student will be able to

CO1: Understand the basics terms, definitions related to solar energy conversion, solar radiation measuring instruments.

CO2: Understand different types of Solar Collectors and their applications.

CO3: Understand the fundamental principles of Wind energy types and its characteristics.

CO4: Understand the methods to harness Electrical Energy from Geothermal and Ocean energies.

CO5: Understand the principles of bio conversion, types, combustion characteristics and its applications

CO6: Understand Direct Energy Conversion principle from Fuel cells and MHD generators.

UNIT - I

Principles of Solar Radiation*:* The role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sunshine, solar radiation data.

UNIT - II

Solar Energy Collection Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage And Applications Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- Solar heating/cooling techniques. Solar distillation and drying, photovoltaic energy conversion.

UNIT – III

Wind Energy Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Biomass Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT - IV

Geothermal Energy Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants and their economics.

UNIT - V

Direct Energy Conversion MHD generators, principles, dissociation and ionization, Hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems. Fuel cells, principle. Faradays laws, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1.G.D. Rai , –Non-Conventional Energy Sources|. 2011

2.Ramesh & Kumar, –Renewable Energy Technologies|, Narosa. 1997

Reference Books :

1.Tiwari and Ghosal , –Renewable energy resources|, Narosa.2005

2.Ashok V Desai, –Non-Conventional Energy|, Wiley Eastern.1990

3.K Mittal ,–Non-Conventional Energy Systems|, Wheeler. 1997

4.Sukhatme, –Solar Energy|. TMH, 2008

Web Resources:

1.https://en.wikipedia.org/wiki/Solar_irradiance

2.http://sfera.sollab.eu/downloads/Schools/Eduardo_Zarza_Basic_concepts.pdf

3.https://en.wikipedia.org/wiki/Solar_energy

4.https://en.wikipedia.org/wiki/Solar_energy

5.https://solarprofessional.com/articles/design-installation/solar-energy-storage

6.https://www.energy.gov/science-innovation/energy-sources/renewable-energy/wind

7.https://www.eia.gov/energyexplained/?page=biomass_home

8.https://en.wikipedia.org/wiki/Geothermal_energy

9.https://www.renewableenergyworld.com/ocean-energy/tech.html

10.http://www.mhdenergy.com/

Question Paper Pattern:

Sessional Exam

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End Exam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e there will be two questions from each unit and the student should answer any one question

INTRODUCTION TO JAVA

V Semester: B.Tech						Scheme: 2017		
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	EndExam	TOTAL
OE310	Open Elective - 1	2	1	-	3	40	60	100
Sessional ExamDuration:2 Hrs						EndExamDuration:3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Understand fundamentals of oops concepts, input and output

CO2: Understand the classes and objects.

CO3: Understand the Inheritance and interfaces

CO4: Understand the string handling methods

CO5: Understand the exception handling

UNIT– I

Object oriented concepts: Fundamentals, Overview of Java, Data types, variables, Operators, control statements, Reading console input, writing console output, arrays.

UNIT– II

Introducing Classes: Class fundamentals, declaring objects, introducing methods, Constructors, this keyword, finalize

UNIT– III

Inheritance: Inheritance basics, using super, method overriding, abstract class, using final with inheritance, Interfaces: Defining interface, implementing interface

UNIT– IV

String Handling: String constructors, Special string operations, character extraction, string comparison, searching strings, modifying strings. StringBuffer class and its methods.

UNIT– V

Exception Handling: Fundamentals, exception types, try, catch, throw, throws, finally. Java built-in exceptions, creating your own exception subclasses.

TextBooks :

1. Herbert Schildt [2008], [9th Edition], The Complete Reference Java2, TATA McGraw-Hill.
2. E Balaguruswamy [2007], [3 rd Edition], Programming with Java, A Primer, TATA McGraw-Hil.

ReferencebBooks :

1. Bruce Eckel [2008], [2nd Edition], Thinking in Java, Pearson Education.
2. H.M Dietel and P.J Dietel [2008], [6th Edition], Java How to Program, Pearson Ed.

WebReferences:

1. https://www.tutorialspoint.com/java/index.html

QuestionPaperPattern:

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EndExam

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2marks. (Total10marks)covering one question from each unit.The remaining five questions shall be EITHER/OR typequestions carrying 10marks each.Each of these questions is from one unit and may contain sub-questions.i.e. there will be two questions from each unit and the student should answer any one question.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA (OOP)

VI Semester: B.Tech						Scheme: 2017		
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	EndExam	TOTAL
OE311	Open Elective-2	3	0	0	3	40	60	100
Sessional ExamDuration:2 Hrs						EndExamDuration:3 Hrs		

CourseOutcomes: At the end of the course students will be able to

CO1: Understand the basic programming constructs and object oriented paradigms.

CO2: Comprehend the java concepts packages and interfaces.

CO3: Implement programs on string handling methods.

CO4: Understand the fundamentals of exception handling mechanism.

CO5: Implement programs on multithreading concepts.

UNIT– I

Fundamentals of Object –Oriented Programming: Introduction, Object-Oriented Paradigm, Basic Concepts of Object Oriented programming, Benefits of OOP, and Applications of OOP.
Introduction to Java: Overview of java, Java Buzzwords, Data types, Variables, Operators.
Decision Making-Branching & Looping: simple if statement, if-else statement,nested if-else, else if ladder,switch statement, While, do-while, for statements, Arrays, Classes, objects and methods.

UNIT– II

I/O: I/O Basics, Reading Console input, writing Console output.
Inheritance: Basic concepts, method overriding, super keyword, dynamic method dispatch, Abstract class, final keyword.
Packages and Interfaces: Packages, Access protection, Importing packages, Interfaces.

UNIT– III

String Handling: String Constructors, Special String Operations-String Literals, String Concatenation, Character Extraction, String Comparisons. Searching Strings, Modifying a string.

UNIT– IV

Exception Handling: Fundamentals, Types of Exceptions, Usage of try, catch, throw throws and finally keywords.

UNIT– V

Multithreading: Concepts of multithreading, Creating threads by extending Thread class and implementing Runnable interface, isAlive( ) and join ( ) methods, Thread Priorities, Synchronization, Inter thread communication.

TextBooks :

1. Herbert Schildt [2017], [10th Edition], Java -T*he Complete Reference* , TATA McGraw-Hill.

ReferenceBooks :

1. Bruce Eckel [2014], [2nd Edition], *Thinking in Java*, Pearson Education.
2. E.Balagurusamy, *Programming with Java: A primer, 5th Edition*, Tata McGraw-Hill, 2017.
3. H.M Dietel and P.J Dietel [2017], [11th Edition], Java How to Program, Pearson Ed.

WebReferences:

1. https://nptel.ac.in/courses
2. https://www.tutorialspoint.com/java/
3. https://www.javatpoint.com

QuestionPaperPattern:

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EndExam

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ETHICAL HACKING (EH)

VI Semester: B.Tech						Scheme: 2017		
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	EndExam	TOTAL
OE312	Open Elective - 2	3	0	0	3	40	60	100
Sessional ExamDuration:2 Hrs						EndExamDuration:3 Hrs		

CourseOutcomes: At the end ofthecoursestudents willbe able to

CO1: Understand the importance of security and ethical hacking.

CO2: Understand about foot printing and types of attacks in social engineering.

CO3: Understand about sniffers and DoS attacks.

CO4: Understand the importance of Session Hijacking types and SQL Injection.

CO5: Understand about buffer overflow attacks and Wireless Hacking Techniques.

UNIT– I

Introduction to Ethical Hacking

Introduction, Ethical hacking terminology, Types of hacking technologies, phases of ethical hacking Essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit.

UNIT– II

Foot printing

Footprinting, Information Gathering Methodology ,Competitive Intelligence, DNS Enumeration, Whois and ARIN Lookups, Types of DNS Records, How Traceroute Is Used in Footprinting Contents, How E-Mail Tracking Works, Web Spiders Work.

Social Engineering

Social Engineering, Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.

UNIT– III

Sniffers

Understand the Protocols Susceptible to Sniffing, Active and Passive Sniffing, ARP Poisoning, Ethereal Capture and Display Filters, MAC Flooding, DNS Spoofing Techniques, Sniffing Countermeasures.

Denial of Service

Denial of Service, Types of DoS Attacks, How DDoS Attacks Work, How BOTs/BOTNETs Work, –Smurfl Attack, SYN Flooding, DoS/DDoS Countermeasures.

UNIT– IV

Session Hijacking

Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Describe How You Would Prevent Session Hijacking.

SQL Injection

SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection Countermeasures.

UNIT– V

Buffer Overflows

Different Types of Buffer Overflow, Methods of Detection, Overview of Stack-Based Buffer Overflows , Overview of Buffer Overflow Mutation Techniques.

Wireless Hacking

Overview of WEP, WPA Authentication Mechanisms, and Cracking Techniques, Wireless Sniffers and Locating SSIDs, MAC Spoofing, Rogue Access Points, Wireless Hacking Techniques, Methods Used to Secure Wireless Networks.

TextBooks :

1. Kimberly graves –CEHOfficial Certified Ethical Hacker Review Guide,‖ Wiley
2. MichealGregg,–Certified ethical hacker (CEH) Cert guide‖,Pearson education, 2014.

ReferenceBooks :

1. Network Security and Ethical Hacking, Rajat Khare, Luniver Press,2006.
2. Patrick Engebretson,–The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy‖,2ed, Syngress Media, 2012.

WebReferences:

1. https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_pdf_version.htm

QuestionPaperPattern:

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End Exam:

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PRINCIPLES OF PROGRAMMING LANGUAGES (PPL)

VI Semester: B.Tech						Scheme: 2017		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
OE313	Open Elective - 2	3	0	0	3	40	60	100
Sessional Exam Duration:2 Hrs						End Exam Duration:3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Understand the importance of Programming Languages.

CO2: Describe the syntax and semantics of a programming language.

CO3: Understand programming constructs and data types.

CO4: Develop Programs in Lisp and prolog.

CO5: Understand and adopt a new programming language.

UNIT– I

Preliminaries

Reasons for studying concepts of programming languages, Programming domains, Language Evolution criteria, Influences on Language Design, Language categories, Language Design Trade-offs, Implementation methods, Programming Environments.

UNIT– II

Syntax and Semantics

Introduction, The general problem of Describing Syntax, Formal methods of describing syntax, Attribute Grammars, Describing the Meanings of programs-Dynamic Semantics, Lexical analysis, Parsing problem, Recursive Descent parsing, Bottom upparsing**.**

UNIT– III

Names, Binding, Type checking, Scopes and Data Types

Introduction, Names, Variables, The concept of binding, Type checking, Strong Typing, Type Compatibility, Scope, Scope and Lifetime, Referencing Environments, Named constants, Data types, Primitive data types, Character string types, User defined ordinal types, Array types, Associative arrays, Record types, Union types, Pointer and reference types.

UNIT– IV

Functional Programming Languages

Introduction, Mathematical functions, Fundamentals of functional programming languages, LISP, An Introduction to Scheme, ML, Haskell.

UNIT– V

Logic Programming Languages

Introduction, A brief introduction to Predicate calculus, Predicate calculus and Proving theorems, An Overview of logic programming, The origins of prolog, Basic elements of prolog, The deficiencies of prolog, Applications of logic programming.

Text Books :

1.Robert W. Sebesta, [Eighth Edition], –Concepts of Programming Languages‖, Addison Wesley, 2007.

Reference Books :

1. Allen B Tucker, Robert E Noon,[2nd Edition],–Programming Languages, Principles& Paradigms‖,TMH.

Web References:

1. https://cs.fit.edu/~ryan/cse4250/

Question Paper Pattern:

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ADVANCED INFORMATION SYSTEMS (AIS)

VI Semester: B.Tech					Scheme: 2017			
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
OE314	Open Elective - 2	L	T	P	C	Continuous Internal Assessment	EndExam	TOTAL
		3	0	0	3	40	60	100
Sessional ExamDuration:2 Hrs					EndExamDuration:3 Hrs			

CourseOutcomes: At the end ofthecoursestudents willbe able to

CO1:Demonstrate the Object oriented concepts.

CO2:Interpret different types of Inheritance and Polymorphism

CO3: Classify layer functionalities of OSI reference model and TCP Protocol suite

CO4: Summarize the concepts of internetworking, security and IP addressing

CO5:Demonstrate different types of protocols and web contents used in web design

UNIT– I

Introduction to Object Oriented Concepts:Introduction, Programming Techniques, Introduction to Object OrientedConcepts, Concept of Structured Procedural Programming, Class, Object
***Characteristics of Objects*:** Data Abstraction, Classification, Encapsulation and Message Passing. Access Specifiers in Class, UML Class Diagrams.

UNIT– II

Advanced Concepts in Object Oriented Technology: Relationships, Inheritance- Protected Access Specifier, Multiple and Multilevel Inheritance, Generalization and Specialization, Abstract classes, Polymorphism, Implementation of OOC through C++.

UNIT– III

Introduction to computer Networks:Introduction, Network Topology, OSI Reference Model,TCP Protocol Suite, Routing Devices, Types of Networks.

UNIT– IV

Internetworking: Protocols for Internetworking, Internet Address and Domains, Packets, Packet Switched Networks, Virtual Private Network, Working of Internet.
Network Security: Authentication, Authorization, Encryption, Security on Web

UNIT– V

Introduction to Web Technology:Introduction, Hyper Text Transfer Protocol(HTTP), File Transfer Protocol (FTP), Domain Name Server(DNS), Web Applications, Types of Web Content, Multi-Tier Web Applications, Performance of Web Applications.

TextBooks :
1. Campus Connect Foundation Programme – Object Oriented Concepts – System Development
2. Campus Connect Foundation Programme – Computer Hardware and System Software Concepts, Programming Fundamentals- Vol. – 1, INFOSYS**.**
3. Campus Connect Foundation Programme – Relational Database Management System, Client Server Concepts, Introduction to Web Technologies - Vol. – 2, INFOSYS
4. E.Balaguruswamy, *Object Oriented programming with C++*,2017
5. *Data Communications & Networking*,Forouzan, Tata McGrawHill, Fifth edition,2017
Reference Books :
1. Herbert Schildt ,*The Complete Reference C++*,McGraw Hill Education, Seventh Edition,2017
2. M.P. Bhave and S.A. Patekar, *Object Oriented Programming with C++*, Pearson Education, 2008
3. Andrew S. Tenenbaum, *Computer networks*,Pearson education, Fifth edition, 2013
Web References:
1. https://www.tutorialspoint.com/cplusplus/
2. https://www.geeksforgeeks.org/computer-network-tutorials/
Question Paper Pattern:
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Note:

1. WiresharktoolcanbeusedtodemonstrateISO/OSI model inUNIT-III
2. Assignment Questions to be given from UNIT-II that maps POs like PO2,PO3.

SCIENTIFIC PROGRAMMING WITH PYTHON (SCIPYP)

VI Semester: B.Tech						Scheme: 2017		
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	EndExam	TOTAL
OE315	Open Elective - 2	3	0	0	3	40	60	100
Sessional ExamDuration:2 Hrs						EndExamDuration:3 Hrs		

CourseOutcomes: At the end ofthecoursestudents willbe able to

CO1: Understand fundamentals of programming –variables, conditions, Lists, Tuples &Dictionaries.

CO2: Understand Arithmetic, Relational, Assignment, Logical, Bitwise, Membership, Identity Operators

CO3: Impart Functions, Scope of variables, Modules, Packages.

CO4: Comprehend Concepts of File I/O, Exception Handling, Classes and Objects.

CO5: Develop general scientific programming through Matplotlib, NumPy and SciPy packages.

UNIT– I

Introduction
History of Python, Features, Advantages, Environment setup and Interaction using Command prompt, IDLE, Script mode, IPython Notebook.
Basic Syntax: Keywords, Identifiers, Variables.
Data Types: Strings, Numbers, Booleans, Date and Time, Lists, Tuples, Dictionaries

UNIT– II

Operators: Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators.
Conditional Statements: if, if-elif-else
Loops: for, while
Control Statements: break, continue, pass

UNIT– III

Functions: Defining Functions, Calling a Function, Function Arguments: Required arguments, Keyword arguments, Default Arguments, Variable-length arguments, Anonymous Functions, The Return Statement, Scope of the Variables in a Function - Global and LocalVariables.
Modules: Defining module, namespacing, Importing modules and module attributes, from. Import statement, Module built-in functions, Introduction to Packages.

UNIT– IV

Error and Exceptions: Difference between an error and Exception, Detecting and Handling Exceptions, Raising Exceptions, Assertions, Built-in Exceptions, User Defined Exceptions
Classes and Objects: Overview of OOP terminology, Creating Classes, Creating Instance Objects, Inheritance, Overriding Methods, Overloading Methods, Operators, Data hiding.

UNIT– V
Simple plotting with pylab: Basic plotting, Labels, legends and customization, More advanced plotting ***Matplotlib:*** Matplotlib basics, Contour plots, heatmaps and 3D plots. ***NumPy:*** Basic array methods, Reading and writing an array to a file, Statistical methods, Polynomial, Linear algebra, Matrices, Random sampling, Discrete Fourier transforms ***SciPy:*** Physical constants and special functions, Integration and ordinary differential equations, Interpolation, Optimization, data-fitting and root-finding. ***General scientific programming:*** Floating point arithmetic, Stability and conditioning, Programming techniques and software development.

TextBooks :
1. Learning To Program With Python- 2011 Richard L. Halterman
2. Learning Scientific Programming with Python, Christian Hill, Cambridge University Press (2016)
ReferenceBooks :
1. Python Programming-An Introduction to Computer Science 2nd edition-John Zelle 2010
2. Python -The Ultimate Beginner‘s Guide! , AndrewJohansen
3. Core Python Programming, Wesley J. Chun, Pearson.
WebReferences:
1. https://www.tutorialspoint.com/python3/
2. https://realpython.com/
QuestionPaperPattern:
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Note:

1. Python IDLE, Ipython notebook tools can be used to develop programs inUNIT-1&UNIT-5.
2. Scope for develop type questions for assignmentfromUNIT-V

FUZZY LOGIC & NEURAL NETWORKS (FLNN)

VI Semester :B.Tech					Scheme : 2017			
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
OE316	Open Elective - 2	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes: At the end of the course the student will be able to

CO1: To Expose the students to the concepts of Neural networks

CO2: To provide adequate knowledge about Supervised Learning feedback networks

CO3: To provide adequate knowledge about Unsupervised Learning feedback networks

CO4: To teach about the concept of fuzziness involved in various systems and to provide adequate knowledge about fuzzy set theory

CO5: To provide adequate knowledge of application in Neural Networks &fuzzylogic to real time systems.

UNIT – I

Introduction to Neural Networks and its Basic Concepts

Biological neurons and McCulloch and Pitts models of neuron, Types of activation functions, Neural networks architectures, Linearly separable and linearly non-separable systems and their examples, Features and advantages of neural networks over statistical techniques, Knowledge representation, learning process, error-correction learning, concepts of supervised, learning, and unsupervised learning

UNIT – II

Supervised Learning Neural Networks:

Single layer perception and multilayer perceptron neural networks, their architecture, Error back propagation algorithm, generalized delta rule, learning factors, step learning, Momentum learning, Concept of training, testing and cross-validation data sets for design and validation of theNetworks

UNIT – III

Unsupervised Learning Neural Networks:

Competitive Learning networks, kohonen self-organizing networks, K-means and LMS algorithms, RBF neural network, its structure and Hybrid training algorithm for RBF neural networks, Comparison of RBF and MLP networks Learning, Hebbian learning, Hopfield networks.

UNIT – IV

Fuzzy logic

Basic Fuzzy logic theory, sets and their properties, Operations on fuzzy set, Fuzzy relation and operations on fuzzy relations and extension principle, Fuzzy membership functions and linguistic variables, Fuzzy rules and fuzzy reasoning, Fuzzification and defuzzification and their methods, Fuzzy inference systems

UNIT – V

Applications:

Applications of Neural Networks: Pattern classification, Handwritten character recognition, Face recognition, Image compression and decompression

Applications of Fuzzy Logic & Fuzzy System: Fuzzy pattern recognition, Fuzzy image processing, Simple applications of Fuzzy knowledge-based controllers like washing machines, traffic regulations, and lift control

Text Books :

1. Timothy J. Ross, Fuzzy Logic with Engineering Applications, John Wiley and sons, III Ed,2010.
2. S. Haykin, –Neural Networks, A Comprehensive Foundation‖, Pearson Education Inc., III Ed2008.
3. Jacek. M. Zurada, –Introduction to Artificial Neural Systems‖, Jaico Publishing House,2006.
4. LaureneFausett, Fundamentals of Neural Networks-Architectures, algorithms andapplications, Pearson Education Inc.,2004.
5. J.S.R. Jang, C.T. Sun, E. Mizutani,, –Neuro Fuzzy and Soft Computing - A computationalApproach to Learning and Machine Intelligence‖, Pearson Education Inc.,2002..
6. Laurence Fausett, ―Fundamentals of Neural Networks‖, PearsonEducation
7. Bart Kosko, ―Neural networks and Fuzzy Systems‖, PearsonEducation

Reference Books :

1. S. Rajsekaran and G. A. VijaylakshmiPai, ―Neural Networks, Fuzzy Logic, andGenetic Algorithms‖,PHI
2. N. Sivanandam, S. Sumathi, and S. N. Deepa, ―Introduction to Neural NetworkUsing MATLAB‖, Tata McGraw-HillPublications
3. S.N.Sivanandam. M.PaulRaj, - Introduction to Artificail Neural Networks, Vikas PublicationHouse Pvt.Ltd, NewDelhi.

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End Exam:

Question paper contains Six questions; question 1 contains 5 short answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

BUILDING INFORMATION MODELLING (BIM)

VI Semester :					Scheme : 2017			
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
OE317	**Open Elective - 2**	**1**	**2**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration: 2 Hrs					**End Exam Duration : 3 Hrs**			

Course Outcomes: At the end of the course students will be able to

CO1: Understand the basics of BIM and their applications

CO2: Understand the usage of BIM tools and Toolbar

CO3: Use advanced editing tools in making a 3D model of any residential/commercial building

CO4: Prepare templates, create basic walls, curtain walls and also edit the walls like divide, creating openings, etc.

CO5: Apply tools like creating floors, roofs, walls, etc. in making 3D models of any type of structure.

UNIT - I

Introduction: The Basics of BIM - What is Revit? - Understanding a BIM Workflow –Leveraging BIM processes - Visualizing – Analyzing - Strategizing - Focusing Your Investment in BIM - Staffing for BIM - Understanding Project Roles - Establishing a BIM Execution Plan - Accessing and Using the Application Menu - Using the Quick Access Toolbar - Getting toKnow the Ribbon - Defining Project Organization - Introducing Datum Objects(Relationships).

UNIT - II

The Basics of the Toolbox: Selecting, Modifying, and Replacing Elements - Selecting Elements - Selection Options - Filtering Your Selection - Using Selection-based Filters - Selecting All Instances – Using the Properties Palette - Matching Properties – Using the Context Menu – Editing Elements Interactively - Moving Elements - Copying Elements – Rotating and Mirroring Elements - Arraying Elements - Scaling Elements – Aligning Elements - Trimming or Extending Lines and Walls - Splitting Lines and Walls - Offsetting Lines and Walls.

UNIT - III

Exploring Advanced Editing Tools: Keeping Elements from Moving - Using the Join Geometry Tool - Using the Split Face and Paint Tools - Copying and Pasting from the Clipboard – Using the Create Similar Tool - Using Keyboard Shortcuts (Accelerators) - Double-click to Edit - Modelling Site Context - Using a Toposurface - Cut/Fill Schedules.

UNIT - IV

Extended Modelling Techniques: Creating Walls and Curtain Walls - Using Extended Modelling Techniques for Basic Walls - Creating Basic Wall Types - Adding Wall Articulation - Modelling Techniques for Basic Walls - Creating Custom In-Place Walls - Creating Stacked Walls - Creating Simple Curtain Walls - Designing a Curtain Wall - Dividing the Surface - Dividing the Surface with Intersects - Applying Patterns - Editing the PatternSurface.

Configuring Templates and Standards: Introducing Project Templates - Customizing Project - Settings for Graphic Quality - Discovering Object Styles - Using Line Settings – Defining Materials - Defining Fill Patterns – Pre-configuring Colour Schemes - Increasing Efficient view Management - Organizing Views –Saving Work - Saving atIntervals.

UNIT - V

Modelling Floors, Ceilings, and Roofs: Understanding Floor Types - Modelling a Floor - Creating a Structural Floor - Sketching for Floors, Ceilings, and Roofs - Modelling Slab Edges - Creating a Custom Floor Edge - Modelling Floor Finishes - Modelling Thick Finishes - Creating Ceilings - Creating a Roof by Face - Creating a Sloped Glazing - Using Slope Arrows - Using Additional Roof Tools - Using Advanced Shape Editing with Floors and Roofs.

Text Books :

1. Karen Kensek, Douglas Noble, *Building Information Modelling*: BIM in Current and Future Practice.
2. Danelle Briscoe [2015],*Beyond BIM - Architecture Information Modelling*, Routledge Publication, ISBN:9781317668107.

Reference Books :

1. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston; *BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors*, John Wiley & Sons, Inc.
2. Bimal Kumar,*A Practical Guide to Adopting BIM in ConstructionProjects.*

Web References:

1. https://www.youtube.com/watch?v=LACe3vtc8dY
2. https://www.youtube.com/watch?v=LQdHkuG4do4

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each.

EndExam:

Question paper contains Six questions; question 1 contains 5 short answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

PRODUCT LIFE CYCLE MANAGEMENT (PLM)

VI Semester:	B.Tech				Scheme :2017			
Course Code	Category	Hours / Week			Credits	Maximum Marks		
OE318	Open Elective - 2	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	-	-	3	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration : 3 Hrs			

Course Outcomes : At the end of the course students will be able to

CO1 :	Understand basic concepts of Java such as operators, classes, objects, inheritance, packages Enumeration and various keywords
CO2 :	Understand product lifecycle management process & different steps in Product development process
CO3 :	Get knowledge on Product data management
CO4 :	Understand the implementation of PLM and its impact on the organization
CO5 :	Understand concept of PLM architecture and information authoring tools

UNIT – I

Introduction to Java (background, facts, editions), JVM, Program Structure (basics of class, object, member variables, methods, naming conventions, static, System), Installing Java, Setting PATH, Compiling & Running a minimal program. Primitive data types, cast, NaN, Two's complement, Variables (rules, types), Operators, Control Structures

UNIT – II

Arrays, Constructors, String class, Inheritance, Packages, Access modifiers, Relational Databases, SQL and JDBC

UNIT – III

PLM Introduction-Organization Business Models(MTS, MTO, CTO, ETO Etc), Basics of Enterprise Systems (PLM, ERP, MES), Background, Overview, Need, Benefits, and Concept of Product Life Cycle, Components / Elements of PLM, Emergence of PLM, Significance of PLM, Differences between PLM and PDM Integrated Product development process-Conceive-Specification, Concept design, Design- Detailed design, Validation and analysis (Simulation), Tool design ,Realize-Plan manufacturing, Manufacture, Build/Assemble, Test(quality check)

UNIT – IV

PLM Components - Workflow Processes, Design Collaboration, Processes Management, Document Management, Visualization, Bill of Materials (BOM) Management, Engineering Change Control, Configuration Management, Manufacturing Process Management, Variant Management, Classification.

UNIT – V
PLM Technologies - PLM Architecture, Various PLM tools, Data Modelling, Security management, CAD Integrations, Information authoring tools (e.g., MCAD, ECAD, Technical publishing), Core functions (e.g., data vaults), Data Flow to Other systems such as Supply chain and ERP systems
Text Books:
1. Grieves, Michael, Product Lifecycle Management, McGraw-Hill
2. Antti Saaksvuori, AnselmiImmonen**,** Product Life Cycle Management - Springer
3. Kari Ulrich and Steven D. Eppinger, Product Design & Development, McGraw Hill
Reference Books:
1. Java - The Complete Reference (English) 9th Edition-herbert-schildt-Mcgraw Hill Education
2. Head First Java (English) 2 Edition- Kathy-Sierra-Publisher: O' Reilly
3. Burden, Rodger PDM: Product Data Management, Resource Publications
Question Paper Pattern:
Sessional Exam The question paper for Sessional examination is for 30 marks, covering halfof the syllabus for first Sessional and remaining half for second Sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each **End Exam** Question Paper Contains Six Questions. Question 1 contains 5 short Answer questionseach of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question

SIMULATION OF ENGINEERING SYSTEMS(SES)

VI Semester:B.Tech					Scheme : 2017			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
OE319	Open Elective - 2	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	3	40	60	100
Sessional Exam Duration:2 Hrs					End Exam Duration: 3Hrs			

Course Outcomes: At the end of the course students will be able to

CO1: Understand the basic features and programming in MATLAB.

CO2: Understand control statements, functions and plotting in MATLAB.

CO3: Understand developing simulation model using simulink library.

CO4: Understand the graphical user interface in MATLAB.

CO5: Understand various tool boxes used in solving engineering problems.

UNIT-I

MATLAB Environment Introduction to Simulation-Installation of MATLAB-History-Use of MATLAB-Keyfeatures.
Introduction to MATLAB Software- MATLAB window- Command window-Workspace-Command history-Current directory Setting-Basic commands-Assigning variables-Operations with variables.

Data types and Operators Character and string- Arrays and vectors- Column vectors-Row vectors. Arithmetic Operators- Relational Operators-Logical Operators- Operator Precedence- BODMAS Rules- Solving arithmetic equations.

Basic Operations Trigonometric functions- Complex numbers- Fractions & Real numbers- Complex numbers

UNIT-II

MATLAB Programming
Working with script tools- Writing Script file- Executing script files- The MATLAB Editor- opening and saving editor.
Creating M files, Saving m-files- Errors and Warnings- Types of errors- error handling- MATLAB Debugger- Setting Break Points- Examining Variables- Stepping through code- ending the debug session- Debugging from command line.

***Loops and Conditional Statements*:** for loop- nested for loop- while loop-
Branch Control Structure: if control statements, switch statement- break statement- continue statement- error statement- try catch structure- Program Termination — return

Functions Writing functions, Writing user defined functions- Built in Function-Function calling-Return Value- Types of Functions-Global Variables.
String Functions- Input/Output Functions.

Plotting
Plots: Plotting vector and matrix data- Plot labeling, curve labeling and editing.
2D Plots: Basic Plotting Functions-Creating a Plot-Plotting Multiple Data Sets in One Graph-Specifying Line Styles and Colors- Graphing Imaginary and Complex Data-Figure Windows-Displaying Multiple Plots in One Figure-Controlling the Axes-Subplots
3Dplots: Use of mesh grid function- Mesh plot-Surface plot

UNIT-III

Simulink

Introduction to Simulink- Simulink Environment & Interface- Study of Library-Object Oriented Design-Equation Oriented Design- - Fixed Step continuous solvers- Variable step continuous solver-Data Import/ Export- Creating and masking a Subsystem- Getting help for Simulink.

Simulation of Numerical Integration, Linear Algebra, Roots of Polynomials, Algebraic equations, Differential Equations-Transforms (Fourier, Laplace).

UNIT-IV

Graphical User Interface Design Introduction of Graphical User Interface- GUI Function Property-GUI Component Design- GUI Container- Writing the code of GUI Callback- Dialog Box- Menu Designing- Creating a database-Applications.

UNIT-V

Applications with MATLAB

Image Processing: Importing and Visualizing Images- Importing and displaying images- Converting between image types- Exporting images- Interactive Exploration of Images- Obtaining pixel intensity values- Extracting a region of interest- Computing pixel statistics-Measuring object sizes.

MATLAB Applications in Control Systems, Neural Networks- Machine Learning, Digital Signal Processing, Communication Systems and Fuzzy Logic Systems.

Text Books:

1. Raj Kumar Bansal, Ashok Kumar Goel and Manoj Kumar Sharma, –MATLAB and its Applications in Engineering‖, Dorling Kindersly India pvt. Ltd, Pearson, 5th Edition 2012.

2.Agam Kumar Tyagi, –MATLAB and Simulink for Engineers‖, Oxford University Press, 2nd Edition,2012.

3.Jaydeep Chakravarthy, ―Introduction to MATLAB Programming, Tool Box and Simulink‖, Universities Press, 2014.

Reference Books:

1. MiszaKalechman , ―Practical MATLAB Basics for engineers‖, CRC Press, Taylor & Francis group,1st Edition, 2012.

2.Rizwan Butt , –An Introduction to differential equations on MATLAB‖, Narosa Publishing house, 2016.

Web References:

1.https://matlabacademy.mathworks.com/

2. https://www.edx.org/course/matlab-octave-beginners-epflx-matlabeoctavebeginnersx

Question Paper Pattern:

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End Exam

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SCRIPTING LANGUAGES FOR VLSI (SLV)

VII Semester: ECE						Scheme:2017		
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECOE1	OE-III	L	T	P	C	ContinuousInternal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Outcomes: At the end of the course the student will be able to

CO1: To understand the Tcl data types, operations and modularizations.

CO2: Work with file systems socket programming and make transactions with input and outputs

CO3: Employ Tcl language constructs of procedures, packages and modules in simple programs

CO4: Introduction to Tk Graphics for creating widget design

CO5: Introduction to Tk Graphics for selecting widget design

UNIT-1

Tcl/Tk Features: Tcl Overview, Tcl As a Glue Language, Tcl As a General-Purpose Interpreter, Tcl As an Extensible Interpreter, Tcl As an Embeddable Interpreter, Tcl As a Rapid Development Tool, GUI-Based Programming, Shipping Products, **Introduction to Tcl**: Overview of the Basics, Command Evaluation and Substitutions, Data Types, Arithmetic and Boolean Operations, Modularization.

UNIT-2

File System, Basic I/O and Sockets: Navigating the File System, Properties of File System Items, Removing Files, Input/Output in Tcl, **Sockets. Strings and Lists**: Converting a String into a List, Examining the List with a for Loop, Using the foreach Command, using string match instead of string first, using lsearch, the regexp Command, creating a Procedure, making a Script, **DataStructures with Lists, Arrays and Dicts**: Using the Tcl List,UsingtheDict,UsingtheAssociativeArray, TreesinTcl,TclandSQL, Performance.

UNIT-3

Procedure Techniques: Arguments to Procedures, Renaming or Deleting Commands, Getting Information About Procedures, Substitution and Evaluation of Strings, Working with Global and Local Scopes, Making a Tcl Object. **Namespaces, Packages and Modules**: Namespaces and Scoping Rules, Packages, Tcl Modules, Namespaces and Packages. Basic Object-Oriented Programming inTcl

UNIT-4

Introduction to Tk Graphics-I: Creating a Widget, Conventions, Common Options, Determining and Setting Options, The Basic Widgets, Introducing Widgets: label, button, and entry, Application Layout: Geometry Managers and Container Widgets

UNIT-5

Introduction to Tk Graphics-II: Selection Widgets: radiobutton, checkbutton, menu, and listbox, Scrollbar, thescale Widget, New Windows, Interacting with the Event Loop, Scheduling the Future, Bottom Line, Using the canvas Widget, Creating a canvas Widget, Creating Displayable canvas Items.

Text Books:

1. Clif Flynt. 2012. *Tcl/Tk, Third Edition: A Developer's Guide* (3rd ed.). Morgan Kaufmann Publishers Inc.,San Francisco, CA, USA.
2. Mark Lutz. 2013. *Learning Python* (5th ed.). O'Reilly Media,Inc.

Reference Books:

1. John K. Ousterhout and Ken Jones. 2008. *TCL and the TK Toolkit (Addison-Wesley ProfessionalComputing)* (2nded.). Addison-Wesley Publishing Company, USA.
2. Brent B. Welch. 2000. *Practical Programming in Tcl and Tk (3rd Ed.)*. Prentice Hall PTR, Upper SaddleRiver, NJ, USA.
3. Mark Lutz. 2010. *Programming Python* (4th ed.) O'Reilly Media, Inc..
4. David Beazley and Brian K. Jones. 2013. *Python Cookbook*. (3rd ed.) O'Reilly Media,Inc..

Web References:

https://nptel.ac.in/courses/117106113/33

https://www.tcl.tk/

https://learning-python.com/about-lp.html#lpscope

http://shop.oreilly.com/product/0636920028154.do

Question Paper Pattern:

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End Exam:

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BIO-MEDICAL ELECTRONICS (BME)

VII Semester : Common for ECE&EEE					Scheme : 2017			
Course Code	Course Category	Hours/Week			Credits	Maximum Marks		
ECOE2	OE-III	L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
		3	0	0	3	40	60	100
Sessional Exam Duration : 2 Hrs					End Exam Duration: 3 Hrs			

Course Outcomes : At the end of the course the student will be able to

CO1:	Introduction to various Concepts of Medical Instrumentation.
CO2:	Toexposethestudentstotheconceptsof organisationofcellandknowledgeaboutBio-Electrodes
CO3:	To provide adequate knowledge about mechanical function and cardiac instrumentation
CO4:	To provide adequate knowledge about Neuro-Mascular Instrumentation.
CO5:	To provide adequate knowledge about Therapeutic equipment.

UNIT – I

Components of Medical Instrumentation System

Bio amplifier. Static and dynamic characteristics of medical instruments. Bio signals and characteristics. Problems encountered with measurements from human beings.

UNIT – II

Organisation of cell

Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuromuscular junction.

Bio Electrodes

Biopotential Electrodes-External electrodes, Internal Electrodes. Biochemical Electrodes.

UNIT – III

Mechanical function

Electrical Conduction system of the heart. Cardiac cycle. Relation between electrical and mechanical activities of the heart.

Cardiac Instrumentation

Blood pressure and Blood flow measurement. Specification of ECG machine. Einthoven triangle, Standard 12-lead configurations, Interpretation of ECG waveform with respect to electro mechanical activity of the heart.

UNIT – IV

Neuro-Muscular Instrumentation

Specification of EEG and EMG machines. Electrode placement for EEG and EMG recording. Interpretation of EEG and EMG.

UNIT – V

Therapeutic equipment

Pacemaker, Defibrillator, Shortwave diathermy. Haemodialysis machine. Respiratory Instrumentation: Mechanism of respiration, Spirometry, Pneumotachograph Ventilators.

Text Books :

1. Hand-bookofBiomedicalInstrumentation–byR.S.Khandpur, McGraw-Hill,2003.
2. Medical Instrumentation, Application and Design – by John G. Webster, JohnWiley.

Reference Books :

1. PrinciplesofAppliedBiomedicalInstrumentation–byL.A. GeoddesandL.E. Baker,JohnWiley andSons.
2. Biomedical Equipment Technology – Carr& Brown, Pearson.

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question paper contains Six questions; question 1 contains 5 short answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any onequestion

DISTRIBUTED EMBEDDED SYSTEMS (DES)

VII - Semester : ECE						Scheme : 2017		
Course Code	**Course Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
ECOE3	**OE-III**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
		3	**0**	**0**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs						**End Exam Duration: 3 Hrs**		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the real time environment and applications.

CO2: Understand System architecture and design of Distributed Embedded Systems

CO3: Understand inter task management and scheduling.

CO4: Understand the network connection of distributed systems

CO5: Analyse the working of multiple embedded devices in a distributed network

UNIT – I

Real Time Environment: Real-time computer system requirements, classification of real time systems, functional requirements, temporal requirements, global time, examples of real time systems.

UNIT – II

Distributed System Design: Need of distributed systems, System Architecture, compatibility, scalability and dependability.

UNIT – III

System Scheduling: Inter component communication, task management, and dual role of time; inter task interactions, Scheduling problem - static & dynamic scheduling – system design – validation – time–triggered architecture.

UNIT – IV

Distributed Networks: Types of networks, comparisons, ISO-OSI model, TCP/IP connections. CAN concepts, Ethernet.

UNIT –V

Case Studies: Bluetooth controlled embedded operations, GSM based embedded operations, and event trigger based embedded applications.

Text Books :

1. Hermann Kopetz, Real–Time systems – Design Principles for distributed Embedded Applications, 2nd Edition, Springer 2011.
2. Glaf P.Feiffer, Andrew Ayre and Christian Keyold, Embedded Networking with CAN and CAN open, Copperhill Media Corporation, 2008.

Reference Books :

1. Andrew S. Tanenbaum Distributed Operating System, Pearson Education.

Web References:

1. http://www.nptelvideos.in/2012/12/digital-systems-design.html

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

VLSI SIGNALPROCESSING (VSP)

VII Semester :ECE						Scheme : 2017		
Course Code	**Course Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
ECOE4	**OE-IV**	**3**	**0**	**0**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs						**End Exam Duration: 3 Hrs**		

Course Outcomes : At the end of the course the student will be able to

CO1: Apply the principles of DFG in DSP architectures.

CO2: Apply pipelining and parallel processing on FIR and IIR systems to achieve high speed and low power.

CO3: Solve Register minimization, retiming, folding techniques for the given digital filter.

CO4: Understand the overview FIR filter Systolic architecture design.

UNIT I

Introduction to Digital Processing System: Introduction, Typical DSP Algorithms, DSP Application demands and scaled CMOS technologies, Representation of DSP Algorithms.

UNIT II

Iteration Bound: Introduction, Data Flow Graph Representations, Loop Bound and Iteration Bound, Algorithms for computing iteration bound, Iteration bound of multirate data flow graphs.

UNIT III

Pipelining and Parallel Processing: Introduction, Pipelining of FIR Digital Filters, Parallel Processing, Pipelining and Parallel Processing for low power

UNIT IV

Folding and Unfolding: Introduction, Definitions and properties, Retiming Techniques, Analgorithm for unfolding, Critical path, Unfolding and retiming, Applications of unfolding, Folding techniques. Register minimization techniques, Register minimization in folded architecture, Folding of multirate systems.

UNIT-V

Systolic Architecture Design: Introduction, System array design methodology, FIR systolic arrays, selection of sch**eduli**ng vector, Matrix-matrix multiplication and 2-D systolic array design, Systolic Design for space representations containing delays.

Text Books :

1. Keshab K. Parthi, *VLSI Digital Signal Processing- System Design and Implementation*, WileyInter Science. 1998.
2. Kung S. Y, H. J. While House, T. Kailath, *VLSI and Modern Signal processing*, Prentice Hall,1985.

Reference Books :

1. Jose E. France, Yannis Tsividis, *Design of Analog, Digital VLSI Circuits for Telecommunications and Signal Processing*, Prentice Hall,1994.
2. Medisetti V. K , *VLSI Digital Signal Processing* , IEEE Press (NY), USA, 1995.

Web References:

1. https://nptel.ac.in/courses/117106093/
2. https://nptel.ac.in/courses/117102060/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1, which carries 6 marks, containsthree short answer questions of two marks each. The remaining three questions shall be EITHER/ORtype questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and maycontain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

COGNITIVE RADIO (CR)

VII Semester : ECE					Scheme : 2017			
Course Code	**Course Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
ECOE5	**OE-IV**	**3**	**0**	**0**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs					**End Exam Duration: 3 Hrs**			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the architecture of SDR and management of unlicensed spectrum.

CO2: Analyze the Aware and Adaptive cognitive radios.

CO3: Know about the spectrum awareness and interference avoidance.

CO4: Understand technical challenges in CR and various spectrum sensing methods.

CO5: Analyze the OFDM based Cognitive radio and MIMO-OFDM channel estimation.

UNIT – I

Software defined Radio:

Basic SDR – Software and Hardware Architecture of an SDR – Spectrum Management – Managing unlicensed spectrum – Noise Aggregation- Component development – Waveform development – Cognitive waveform development

UNIT – II

Cognitive Radio Technology:

Introduction – Radio flexibility and capability – Aware – Adaptive – Comparison of Radio capabilities and Properties – Available Technologies – IEEE 802 Cognitive Radio related activities.

UNIT – III

Spectrum Awareness:

Introduction, The Interference avoidance problem, Cognitive Radio Role, Spectral footprint minimization,

Creating Spectrum Awareness-Spectrum usage reporting, Spectrum sensing, Potential Interference analysis, Distributed sensing and operation, Channel awareness and multiple signals in space.

UNIT – IV

Cognitive Radio technical challenges and spectrum sensing :

Design Challenges associated with CR -Hardware requirements-Hidden primary user problem-Detecting spread spectrum primary users-Sensing duration and frequency- Security.

Spectrum sensing overview – Classification - Matched filter – waveform based sensing – cyclo-stationary based sensing – Energy detector based sensing – Radio Identifier – Cooperative sensing- other sensing methods.

UNIT – V

OFDM based Cognitive Radio :

A Basic OFDM System Model, OFDM based cognitive radio, Cognitive OFDM Systems, Multi-band OFDM, MIMO-OFDM system model, MIMO channel estimation , MIMO-OFDM synchronization.

Text Books :

1.Bruce A. Fetti, –*Cognitive Radio technology"*, 1st Edition, Elsevier.

1. H.Arslan –*Cognitive Radio, SDR and Adaptive Wireless Systems*|, Springer,2007.

Reference Books :

1.K.C.Chen, R.Prasad , –*Cognitive Radio Networks*| , Wiley, 2009.

2.J. H. Reed, –*Software Radio*|, Pearson, 2004.

3. Paul Burns, –*Software defined radio for 3G*|, Artech House, 2003.

Web References :

1.https://nptel.ac.in/courses/108107107/3
2 https://www.youtube.com/watch?v=hzxgDyXbpt4
3.https://www.youtube.com/watch?v=z-E5jIoUFbA

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 30 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. Question No 1 which carries 6 marks contains three short answer questions of two marks each. The remaining three questions shall be EITHER/OR type questions carrying 8 marks each

End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.

ROBOTICS AND AUTOMATION (RAA)

VII - Semester : ECE					Scheme : 2017			
Course Code	**Course Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**TOTAL**
ECOE6	**OE – IV**	**3**	**0**	**0**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 2 Hrs					**End Exam Duration: 3 Hrs**			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand anatomy and laws of robotics

CO2: Analyse the role of microcontrollers in robotic applications

CO3: Program the sensor operations with microcontrollers

CO4: Program the motor and sensor based robotic applications

CO5: Utilize the programming languages in multiple robot applications

UNIT – I

Basic Concepts: Definition and origin of robotics, anatomy of robot, different types of robotics, various generations of robots, degrees of freedom, Asimov‘s laws of robotics, applications of robots.

UNIT – II

Role of Microcontrollers: Levels of microcontrollers, basic controller MC51pin structure, I/O ports, Timers ADC, DAC, Switches, LEDs, time based interfacing.

UNIT – III

Sensors and Actuators: Sensors vs Actuators, Basic requirements of a sensors, Classification of sensors,

Examples, Triggered based interfacing, Elevator, Assembly programming of sensor interfacing.

UNIT – IV

Case Studies - I: Hydraulics and Kinematics, robot programming languages, Block diagrams and programming using C and Assembly language of Line followers, Obstacle Detectors, Speed Controlled Motion in robots.

UNIT –V

Case Studies –II : Arduino design of robotic applications, voice command based robots, Multiple robots, machine interface, robots in manufacturing and non- manufacturing applications robot cell design

Text Books :

1. Introduction to Robotics Analysis, Systems, Applications, Saeed B. Niku, Prentice Hall of India/Pearson Education, Asia, 2001.
2. Industrial Robots - Technology Programming and applications, Mikell P. Groover, et.al McGraw Hill, 1980.

Reference Books :

1. *Robotics for Engineers*, YoranKoren, McGraw Hill. 1980
2. *Introduction to Robotics Mechanics and Control* , Craig, Second edition, Pearson Education, Asia,2004.
3. *Robotics Technology and Flexible Automation*, Satya Ranjan Deb, TMH, New Delhi,2001.

Web References:

1. http://nptel.ac.in/courses/117106086
2. http://www.nptelvideos.in/2012/12/robotics.html

Question Paper Pattern:

Sessional Exam:

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End Exam:

Question Paper Contains Six Questions. Question 1 contains 5 short Answer questions each of 2 marks. (Total 10 marks) covering one question from each unit. The remaining five questions shall be EITHER/OR type questions carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. i.e. there will be two questions from each unit and the student should answer any one question.