Program outcomes (POs)- Engineering & Technology

Engineering Graduates will be able to:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMESS: (PSOs)- B.Tech(ECE)

At the end of the program the student will be able to

PSO1 Inculcate an ability to understand and apply the subject-specific knowledge to the practical problems in the areas of electronics and communication engineering

PSO2 investigate and provide ecologically sustainable, cost-effective solutions to the problems in the subject area

PSO3 Enhance of competence in engineering modelling and experimental capabilities to pursue research oriented higher education

PSO4: be aware about the latest technology in hardware.

PSO5: be exposed to industrial training giving hands on experience.

M.D UNIVERSITY

SCHEME OF STUDIES AND EXAMINATION
B.Tech II YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)
SEMESTER III
'F' Scheme effective from 2010-11

Sr No	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
HUM-201-F OR MATH-201-F	ENGG. ECONOMICS OR MATHEMATICS - III	3 3	1 2	- -	4 5	50	100	-	150	3
HUM-203-F	FUNDAMENTALS OF MANAGEMENT (COMMON FOR ALL BRANCHES)	3	1	-	4	50	100	-	150	3
EE-201-F	ELECTRONICS DEVICES & CIRCUITS(ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-203-F	NETWORK THEORY (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-205-F	ELECTROMECHANICAL ENERGY CONVERSION(ECE,EI,IC)	3	1	-	4	50	100	-	150	3
CSE-201-F	DATA STRUCTURE USING ' C' (ECE,EI,CSE,IT)	3	1	-	4	50	100	-	150	3
EE-221-F	ELECTRONIC WORKSHOP, PCB DESIGN & CIRCUIT LAB(ECE,EI)	-	-	2	2	25	-	25	50	3
EE-223-F	NETWORK THEORY LAB(ECE,EI,EE,EEE,IC)	-	-	2	2	25	-	25	50	3
EE-225-F	ELETRICAL WORKSHOP & MACHINE LAB (ECE,EI)	-	-	3	3	50	-	50	100	3
CSE-205-F	DATA STRUCTURE USING 'C' Lab (ECE,EI,CSE,IT)		-	2	2	25	-	25	50	3
	TOTAL	**18**	**7**	**9**	**33 Or 34**	**425**	**600**	**125**	**1150**	

NOTE:

1. **Students will be allowed to use non-programmable scientific calculator. However, Sharing of Calculator and other material will not be permitted in the examination.**

HUM-201-F **ENGINEERING ECONOMICS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

Section-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Section-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run. Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Section-D

Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and supply on prices.

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

COURSE OUTCOMES

Upon successful completion of this course, the student will be able to:

CO1 - explain the basic economic principles of wants, scarcity, choice, opportunity cost, etc as applied to business organizations and engineering firms;

CO2 - understand the role of demand and supply law

CO3 - carry out the cost analysis of a manufactured product;

TEXT BOOKS :

1. Principles of Economics : P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

REFERENCE BOOKS :

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy : Rudar Dutt & K.P.M. Sundhram

MATHEMATICS-III

MATH-201-F

(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.
Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Section-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity. Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and fourmula.

Section-C

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).
Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Section-D

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.
Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

Course Outcomes

The students will learn:

CO1 - The tool of Fourier series and Fourier Transform for learning advanced Engineering Mathematics.

CO2 - The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

CO3 - The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO4 - The basic ideas of statistics including various discrete and Continuous probability distributions.

TEXT BOOKS :

1. Engg Mathematics By Babu Ram, Pearson India
2. Advanced Engg. Mathematics : F Kreyszig.
3. Higher Engg. Mathematics : B.S. Grewal.

REFERENCE BOOKS :

1. Advance Engg. Mathematics : R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics : Michael D. Greenberg.
3. Operation Research : H.A. Taha.
4. Probability and statistics for Engineers : Johnson. PHI.

HUM-203-F **FUNDAMENTALS OF MANAGEMENT**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Meaning of management, Definitions of Management, Characteristics of management, Management Vs. Administration. Management-Art, Science and Profession. Importance of Management. Development of Management thoughts.

Principles of Management. The Management Functions, Inter-relationship of Managerial functions.

Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

Section-B

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods**.**

Section-C

Marketing Management - Definition of marketing, Marketing concept, objectives & Functions of marketing.

Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

Section-D

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

COURSE OUTCOMES

Upon successful completion of this course, the student will be able to:

CO1 - explain the basic economic principles of wants, scarcity, choice, opportunity cost, etc as applied to business organizations and engineering firms;

CO2 - understand the role of demand and supply law

CO3 - carry out the cost analysis of a manufactured product;

CO4 - fully understand nature and characteristics of Indian Economy

TEXT BOOKS :

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

REFERENCE BOOKS :

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).

4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

EE-201-F **ELECTRONIC DEVICES & CIRCUITS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

CONDUCTING MATERIALS:

Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, super conductivity, effect of magnetic field, conducting materials, applications.

SECTION-B

SEMICONDUCTORS, CONSTRUCTION AND CHARACTERISTICS OF DEVICES:

Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction.

Brief introduction to Planar Technology for device fabrication. metal -semiconductor junctions (ohmic and non-ohmic), breakdown mechanisms in p-n junction, zener diode, electrical and optical excitation in diodes, LED, solar cells and photo-detectors. And characteristics.

SECTION-C

Transistors: Metal-semiconductor-field-effect-transistors (MESFET), Metal-insulator-semiconductor-field-effect-transistors (MISFET), Metal oxide semiconductor field effect transistor (MOSFET): Construction, Operation and characteristics of above devices.

Bipolar junction transistors: Fundamentals of BJT operation, amplification with BJTs,

SECTION –D

SOME SPECIAL DEVICES:

Photodiodes, photo detectors, solar cell, light emitting diodes, semiconductor lasers, light emitting materials. Tunnel Diode: degenerate semiconductors, IMPATT diode; The transferred electron mechanism: The GUNN diode.P-N-P-N diode, semiconductor controlled rectifier (SCR), bilateral devices: DIAC, TRIAC, IGBT

COURSE OUTCOMES:

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

CO1 - This course prepares students to take advanced courses in the related fields.

CO2 - This course is very helpful in understanding the various phenomena/mechanisms which are very useful to understand working of electronic devices like Diodes, Transistors and some special devices like Tunnel Diode, IMPATT diode, GUNN diode, P-N-P-N diode

CO3 – understand the concepts of SCR, DIAC, TRIAC, IGBT etc.

Text Books:

1. Agarwal - Foundations of analog & Digital electronic Circuits,Elsevier
2. B. G. Streetman and S. Banerjee “Solid state electronics devices”, 5th Edition, PHI.
3. Donald Neamaen, “Electronic Circuit Analysis and Design”, 3rd Edition, TMH.

Reference Books:

1. Alok Dutta, “Semiconductor Devices and circuits”, Oxford University Press.
2. Ashby - Engineering Materials : Science and design,Elsevier

EE-203-F **NETWORK THEORY**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Signal analysis, complex frequency, and network analysis. General characteristics and descriptions of signals, step function and associated wave forms, The unit impulse Introduction to network analysis, network elements, initial and final conditions, step and impulse response, solution of network equations,

SECTION-B

Review of Laplace transforms, poles and zeroes, initial and final value theorems, The transform circuit, Thevenin's and Norton's theorems, the system function, step and impulse responses, the convolution integral. Amplitude and phase responses. Network functions, relation between port parameters, transfer functions using two port parameters, interconnection of two ports.

SECTION-C

Hurwitz polynomials, positive real functions. Properties of real immittance functions, Synthesis of LC driving point immittances, Synthesis of RC driving point impedances, Synthesis of RC impedances or RL admittances, properties of RL impedances and RC admittances.

SECTION-D

Properties of transfer functions, zeroes of transmission, synthesis of Y_{21} and Z_{21} with 1 terminations Introduction to active network synthesis, Network Tropology and Graph Theory.

Course outcomes:

At the end of the course student will have ability to

CO1 - Articulate in working of various components of a circuit.

CO2 - Familiar with ac and dc circuits solving.

CO3 - Ready with the most important concepts transient analysis in both A.C and D.C.

CO4 - Solve Circuits using Tree, Node, Cut-set and Tie-Set Methods in network topology.

CO5 - Loop and Nodal analysis in A.C circuit with the application of Laplace as a tool.

Text Books:

1. Bird - Electric Circuit theory & technology,Elsevier
2. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
3. D Roy Choudary, "Network and Systems" New Age International,

Reference Books:

1. M. E. Van Valkenberg, “Network Analysis”, 2nd Edition, Prentice Hall of India Ltd.

EE-205-F **ELECTROMECHANICAL ENERGY CONVERSION**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

MAGNETIC CIRCUITS AND INDUCTION:
Magnetic Circuits, Magnetic Materials and their properties, static and dynamic emfs and force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

SECTION-B

DC MACHINES :
Basic theory of DC generator, brief idea of construction, emf equation, load characteristics, basic theory of DC motor, concept of back emf, torque and power equations, load characteristics, starting and speed control of DC motors, applications.

SECTION -C

Synchronous Machine
Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation

Synchronous Motor: Starting methods, Effect of varying field current at different loads, V- Curves.

SECTION-D

Three phase Transformer & Induction Machine
Three Phase Transformer: Review of Single phase transformer. Three Phase transformer: Basics & operation Induction Machine: Constructional features, Rotating magnetic field, Principle of operation Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator & its applications. Introduction of S**ingle phase Induction Motor, R**epulsion motor. **AC Commutator Motors:**Universal motor, Single phase a.c. series compensated motor, stepper motors

Course Outcomes

By the end of the course students will be able to:

CO1 - Understand and analyse basic electric and magnetic circuits
CO2 - Understand the working principles of DC machines and synchronous machine.
CO3 – understand the working principles of transformer & induction machine.

Text Books:

1. D.P.Kothari & I.J.Nagrath, “Electric Machines”, Tata Mc Graw Hill
2. Ashfaq Hussain“Electric Machines” Dhanpat Rai & Company

Reference Books:

1. P.S.Bimbhra, “Electrical Machines”, Khanna Publisher

2. Fitzerald,A.E.,Kingsley and S.D.Umans “Electric Machinery”, MC Graw Hill.

CSE-201 F **DATA STRUCTURE USING 'C'**

(ECE, EI, CSE, IT)

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Overview of 'C' : Introduction , Flow of Control, Input output functions, Arrays and Structures, Functions **Data structures and Algorithms: an overview** : concept of data structure, choice of right data structures, types of data structures, basic terminology Algorithms, how to design and develop an algorithm: stepwise refinement, use of accumulators and counters; algorithm analysis, complexity of algorithms Big-oh notation. **Arrays : Searching Sorting**: Introduction, One Dimensional Arrays, operations defined : traversal, selection, searching, insertion, deletion, and sorting
Searching: linear search, binary search; Sorting: selection sort, bubble sort, insertion sort, merge sort, quick sort, shell sort. Multidimensional arrays, address calculation of a location in arrays.

Stacks and queues: Stacks, array representation of stack. Applications of stacks. Queues, Circular queues, array representation of Queues, Deques, priority queues, Applications of Queues.

Section-B Pointers and Linked Lists;

Pointers: Pointer variables, Pointer and arrays, array of pointers, pointers and structures, Dynamic allocation.
Linked Lists: Concept of a linked list,. Circular linked list, doubly linked list, operations on linked lists. Concepts of header linked lists. Applications of linked lists, linked stacks, linked Queues.

Section-C Trees and Graphs

Trees: Introduction to trees, binary trees, representation and traversal of trees, operations on binary trees, types of binary trees, threaded binary trees, B Trees, . Application of trees.
Graphs : Introduction, terminology, 'set, linked and matrix' representation, operations on graphs, Applications of graphs.

Section-D file Handling and Advanced data Structure

Introduction to file handling, Data and Information, File concepts, File organization, files and streams, working with files. AVL trees, Sets, list representation of sets, applications of sets, skip lists

Course Outcomes-

CO1 - Student will be able to choose appropriate data structure as applied to specified problem definition.

CO2 - Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

CO3 - Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.

CO4 - Students will be able to use linear and non-linear data structures like stacks, queues , linked list etc.

Text Books:

1 Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
2 Data Structures using C by A. K. Sharma, Pearson

Reference Books:

1 Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
2 Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW
3 Fundamentals of computer algorithms by Horowitz Sahni and Rajasekaran.
4 Data Structures and Program Design in C By Robert Kruse, PHI,
5 Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH
6 Introduction to Computers Science -An algorithms approach , Jean Paul Tremblay, Richard B. Bunt, 2002, T.M.H.
7 Data Structure and the Standard Template library – Willam J. Collins, 2003, T.M.H

EE-221-F **PCB & ELECTRONIC WORKSHOP LAB**

L T P	Class Work marks	: 25
0 0 2	Theory marks	: 25
	Total marks	: 50

Experiment to be performed

1. Introduction & Hands on experience to use circuit creation & simulation software like TINAPRO , P-SPICE or ORCAD etc.

2. Design a full wave centre tapped rectifier & study the effect of capacitive filter & its output on a virtual oscilloscope.

3. Design a RLC resonance circuit & verify the transient & phase response for different values of R,L &C.

4. Design a circuit for a fixed power supply.

5. Design a half adder using discrete components & verify the timing diagrams.

6. Convert the power supply circuit into PCB & simulates its 2D & 3D view.

7. PCB printing using screen printing or any other technique.

8. Etching of the above PCB.

9. UV exposure & Drilling of PCB.

10. Coating of etched PCB to protect it from oxidation.

11. Fabrication & placing of components as per above power supply circuit.

12. Testing of above circuit.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

Course Outcomes:

At the end of this course students shall be able to

CO1 practically learn Half wave rectifier

CO2 practically learn Full wave rectifier

CO3 practically learn design of any kind of circuit

CO4 practically learn photosynthesis, photolithography and materialisation

EE-223-F **NETWORK THEORY LAB**

L T P
0 0 2

Class Work marks : 25
Theory marks : 25
Total marks : 50

LIST OF EXPERIMENTS:

A: Simulation based

1. Introduction of circuit creation & simulation software like TINAPRO, P-Spice, Dr.-Spice/other relevant Software
2. Transient response of RC, RL circuit on any of above software.
3. To find the resonance frequency, Band width of RLC series circuit using any of above software.
4. To plot the frequency response of low pass filter and determine half-power frequency.
5. To plot the frequency response of high pass filter and determine the half-power frequency.
6. To plot the frequency response of band-pass filter and determine the band-width.

B: Hardware Based

7. To calculate and verify "Z" & “Y” parameters of a two port network.
8. To determine equivalent parameter of parallel connections of two port network and study loading effect.
9. To calculate and verify "ABCD" parameters of a two port network.
10. To synthesize a network of a given network function and verify its response.

Course outcomes:

At the end of the course student will have ability to

CO1 - Articulate in working of various components of a circuit.

CO2 - Familiar with ac and dc circuits.

CO3 - Experimental transient analysis in both A.C and D.C.

CO4 - Experimentally prove the A, B, C, D and Z, Y Parameter model.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

EE-225-F **ELETRICAL WORKSHOP & MACHINE LAB**

L T P	Class Work marks	: 50
0 0 3	Theory marks	: 50
	Total marks	: 100

LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study fuses, relays, contactors, MCBs and circuit breakers, fluorescent tube light.
5. Study of construction of a DC machine.
6. To plot O.C.C of a DC shunt generator and find its Critical Resistance.
7. To perform direct load test of a DC motor.
8. Speed control of a DC motor by armature control and field control methods.
9. To perform open circuit and block rotor tests of an induction motor.
10. Star-delta starting of a three phase induction motor.
11. Plot O.C.C of a synchronous generator.
12. To plot V-curve of a synchronous motor.

Course Outcomes: Learner will be able to…

CO1 - Draw and practice simple house wiring and testing methods

CO2 - Develop practical workshop skills in the students.

CO3 - Grasp the applications of workshop equipment, wiring accessories etc

CO4 - Physical realization of the range of discrete and integrated semiconductor devices.

CO5 - Knowledge of protective devices in electric circuits like fuse, ELCB, MCB etc.

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

CSE-231-F **DATA STRUCTURE USING 'C' LAB**

L T P		
0 0 2	Class Work marks	: 25
	Theory marks	: 25
	Total marks	: 50

1. Write a program to search an element in a two-dimensional array using linear search.
2. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method
3. Write a program to perform following operations on tables using functions only
   a) Addition b) Subtraction c) Multiplication d) Transpose
4. Using iteration & recursion concepts write the programs for Quick Sort Technique
5. Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.
6. Write a program for swapping of two numbers using 'call by value' and 'call by reference strategies.
7. Write a program to implement binary search tree.
   (Insertion and Deletion in Binary search Tree)
8. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list
9. Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file.
10. Create a linked list and perform the following operations on it
    a) add a node b) Delete a node
11. Write a program to simulate the various searching & sorting algorithms and compare their timings for a list of 1000 elements.
12. Write a program to simulate the various graph traversing algorithms.
13. Write a program which simulates the various tree traversal algorithms.

COURSE OUTCOMES: After the completion of the course the student will be able to:

CO1 - summarize searching and sorting techniques
CO2 - describe stack, queue and linked list operation.
CO3 - have knowledge of tree and graphs concepts.
CO4 - Know about the basic concepts of Function, Array and Link-list.
CO5 - Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.

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

M.D UNIVERSITY
SCHEME OF STUDIES AND EXAMINATION
BE. II YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)
SEMESTER – IV
'F' Scheme effective from 2010-11

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
HUM-201-F OR MATH-201-F	ENGG. ECONOMICS OR MATHEMATICS - III	3 3	1 2	- -	4 5	50	100	-	150	3
EE-228-F	SIGNALS & SYSTEMS(ECE,EI)	3	-	-	3	50	100	-	150	3
EE-202-F	ANALOG ELECTRONICS (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-204-F	DIGITAL ELECTRONICS (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-206-F	COMMUNICATION SYSTEMS(ECE)	3	1	-	4	50	100	-	150	3
EE-208-F	ELECTRO MAGNETIC THEORY (ECE,EI,EE,EEE,IC)	3	1	-	4	50	100	-	150	3
EE-222-F	ANALOG ELECTRONICS LAB(ECE,EI,EE,EEE,IC)	-	-	2	2	25	-	25	50	3
EE-224-F	DIGITAL ELECTRONICS LAB(ECE,EI,EE,EEE,IC)	-	-	2	2	25	-	25	50	3
EE-226-F	COMMUNICATION SYSTEMS LAB (ECE)	-	-	2	2	25	-	25	50	3
MATH-204 –F	NUMERICAL METHODS OF COMPUTATIONAL PROGRAMMING LAB(ECE,EI,EE,EEE,IC)	1	1	2	4	25	-	25	50	3
GP-202-F	GENERAL PROFICIENCY (COMMON FOR ALL BRANCHES)	-	-	2	2	50	-	-	50	3
	TOTAL	**19**	**6 Or 7**	**10**	**35 Or 36**	**450**	**600**	**100**	**1150**	

Note:

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator and other materials will not be permitted in the examination.

2.Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the V semester.

HUM-201-F **ENGINEERING ECONOMICS**

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

Section-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Section-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run. Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Section-D

Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and supply on prices.

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

COURSE OUTCOMES

Upon successful completion of this course, the student will be able to:

CO1 - explain the basic economic principles of wants, scarcity, choice, opportunity cost, etc as applied to business organizations and engineering firms;

CO2 - understand the role of demand and supply law

CO3 - carry out the cost analysis of a manufactured product;

TEXT BOOKS :

1. Principles of Economics : P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

REFERENCE BOOKS :

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy : Rudar Dutt & K.P.M. Sundhram

MATH-201-F **MATHEMATICS-III**

(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L T P		
3 1 0	Class Work marks	: 50
	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.
Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Section-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity. Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and fourmula.

Section-C

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).
Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Section-D

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.
Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

Course Outcomes The students will learn:

CO1 - The tool of Fourier series and Fourier Transform for learning advanced Engineering Mathematics.

CO2 - The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

CO3 - The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO4 - The basic ideas of statistics including various discrete and Continuous probability distributions.

CO5 - The statistical methods of studying data samples.

CO6 - The effective mathematical tools for the solutions of Linear Programming Problem (LPP).

TEXT BOOKS :

1. Engg Mathematics By Babu Ram, Pearson India
2. Advanced Engg. Mathematics : F Kreyszig.
3. Higher Engg. Mathematics : B.S. Grewal.

REFERENCE BOOKS :

1. Advance Engg. Mathematics : R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics : Michael D. Greenberg.
3. Operation Research : H.A. Taha.
4. Probability and statistics for Engineers : Johnson. PHI.

EE-202-F **ANALOG ELECTRONICS**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Semiconductor Diode: Review of P-N junction and Characteristics, P-N junction as a rectifier, Switching characteristics of Diode, Diode as a circuit element, the load-line concept, half-wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

SECTION-B

MOSFET: Review of device structure operation and V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, small-signal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier

SECTION -C

BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, frequency response of CE amplifier.

SECTION-D

Operational Amplifier: Inverting and non-inverting configurations, difference amplifier, Effect of finite open loop gain and bandwidth on circuit performance, Large signal operation of op-amp.

Feedback: The general feed back structure, properties of negative feed back, the four basic feed back topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

Differential Amplifier: MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair, other non-ideal characteristic of the Differential amplifier (DA), DA with active load

COURSE OUTCOMES:

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

CO1 - take advanced courses in the related fields and finally equips them to take up R&D in semiconductor materials and optimized circuit designing.

CO2 - understand the various phenomena/mechanisms which are very useful in designing electronic devices, Biasing of BJT and FET.

CO3 - understand the concepts of Operational amplifiers.

CO4 - understand the concepts of feedback amplifier.

CO5 - understand the concepts of power amplifiers..

Text Books:

1. Foundations of Analog & Digital electronic Circuits, Agarwal, Elsevier
2. **A. S. Sedra and K. C. Smith, "**Microelectronic Circuits", Oxford University Press, 5th Ed.
3. Integrated Electronics: Millman & Halkias ; McGrawHill
4 Electronic circuit analysis and design (Second edition): D.A.Neamen; TMH

Reference Books:

1. Spencer and Ghausi, Introduction to Electronic Circuit Design, Pearson Education, 2003
2. A. Dutta, Semiconductor Devices and Circuits, Oxford University Press, ND 2008

EE-228-F **SIGNALS & SYSTEMS**

L T P	Class Work marks	: 50
3 - -	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Signals: Definition, types of signals and their representations: continuous-time/discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, one-dimensional/multi-dimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables).

SECTION-B

Fourier Transforms (FT):

(i) Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT

(ii) Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT

SECTION-C

Time and frequency domain analysis of systems

Analysis of first order and second order systems, continuous-time (CT) system analysis using LT, system functions of CT systems, poles and zeros, block diagram representations; discrete-time system functions, block diagram representation, illustration of the concepts of system bandwidth and rise time through the analysis of a first order CT low pass filter

SECTION D

Laplace-Transform (LT) and Z-transform (ZT):

(i) One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC) (ii) One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping .

COURSE OUTCOMES:

CO1 - To make students implement the concepts studied in the area of signals and system.

CO2 - Impart the understanding about the fundamentals of signals and systems and their classification

CO3 - To develop practical understanding, limitations and constraints of the theory they learn.

CO4 - Application of Fourier series/ Fourier transform for both continuous and discrete time signals and the study of their properties.

CO5 - Study and application of Laplace and Z transform

Text Books:

1. `Signal and Systems' I J NAGRATH, R. RANJAN & Sharan, 2009 Edn., TMH, New Delhi

Reference Books:

1. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals & System',PEARSON

Education, Second Edition, 2003.
2. Schaume Series on Signals & Systems, HSU & RANJAN, TMH,India

EE-204-F **DIGITAL ELECTRONICS**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes.

Gate-level minimization: The K-map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method)

SECTION-B

Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers ,demultiplexers

SECTION -C

Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.
Registers and counters: Shift registers, ripple counter, synchronous counter, other counters

SECTION- D

Memory and programmable logic: RAM, ROM, PLA, PAL. Design at the register transfer level: ASMs, design example, design with multiplexers. Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race Free State assignment, hazards

Text Book:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education
2. Pedroni - Digital Electronics & Design, Elsevier
3. R.P. Jain , "Modern digital electronics" , 3rd edition , 12th reprint TMH Publication, 2007.
4. Digital Design and computer organization: Nasib Singh Gill & J. B. Dixit, university press(Laxmi Publication)

COURSE OUTCOMES (CO):

CO1 - Helping the students to gain insight into the subject, to develop suitable hardware/software that addresses the industrial/social problems effectively.
CO2 - Introduce the concept of number systems with emphasis on binary numbers, its algebra and minimization techniques.
CO3 - Design and analysis of combinational and sequential logic circuits.
CO4 - Understanding various memories used in the circuits.
CO5 - Understanding of various examples of state machines and different state diagrams.

REFERENCE BOOKS :

1. Grout - Digital Design using FPGA'S & CPLD's, Elsevier
2. F. Vahid: Digital Design*:* Wiley Student Edition, 2006
3. J. F. Wakerly, *Digital Design Principles and Practices*, Fourth Edition, Prentice-Hall, 2005.
4. R. L. Tokheim, *Digital electronics, Principles and applications*, 6th Edition, Tata McGraw Hill

Edition, 2003

EE-206-F **COMMUNICATION SYSTEMS**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

INTRODUCTION TO COMMUNICATION SYSTEMS:
The essentials of a Communication system, modes and media's of Communication, Classification of signals and systems , Fourier Analysis of signals. Analog Communication & Digital Communication. Basic concepts of Modulation, Demodulators, Channels,Multiplexing & Demultiplexing.

SECTION-B

AMPLITUDE MODULATION:
Amplitude modulation, Generation of AM waves, Demodulation of AM waves, DSBSC, Generation of DSBSC waves, Coherent detection of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB).
ANGLE MODULATION :
Basic definitions: Phase modulation (PM) & frequency modulation(FM), narrow band frequency modulation, wideband frequency modulation, generation of FM waves, Demodulation of FM waves.

SECTION C

PULSE ANALOG MODULATION: Sampling theory, sampling and hold circuits. Time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.
PULSE DIGITAL MODULATION : Coding & Decoding techniques, Elements of pulse code modulation, noise in PCM systems, Measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM)

SECTION D

DIGITAL MODULATION TECHNIQUES: ASK, FSK, BPSK, QPSK, M-ary PSK. PC-PC data Communication
INTRODUCTION TO NOISE: External noise, Internal noise, S/N ratio, noise figure.

Course Outcome:-

CO1 - Gained the fundamental knowledge about communication system and modulation techniques.

CO2 - Will able to plan and engineer any communication link between two stations commercially.

CO3 – will be able to understand the types of noise and digital modulation techniques.

TEXT BOOKS:

1. Communication systems (4th edn.): Simon Haykins; John wiley & sons.
2. Communication systems: Singh & Sapre; TMH.

REFERENCE BOOKS :

1. Electronic Communication systems : Kennedy; TMH.
2. Communication Electronics : Frenzel; TMH.
3. Communication system : Taub & Schilling; TMH.

EE-208-F **ELECTROMAGNETIC FIELD THEORY**

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION-A

Coordinate systems and transformation: Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector calculus: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar

SECTION-B

Electrostatics: Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses's Law – Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields. Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary condition. Electrostatic boundary value problems: Poission's and Laplace's equations, general procedures for soling Poission's or Laplace's equations, resistance and capacitance, method of images.

SECTION-C

Magnetostatics: Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential.
Magnetic forces, materials and de vices: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy

SECTION-D

Waves and applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form.
Electromagnetic wave propagation: Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain wave in a normal incidence. Transmission lines: Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power,

COURSE OUTCOMES:

CO1 - To make students implement the concepts studied in different area of engineering course.
CO2 - To develop practical understanding, limitations and constraints of the theory they learn.
CO3 - To motivate and generate their interest in various areas of their field.
CO4 - Manage complex Electronics Engineering based projects that are motivational, entrepreneurial, research and/or industry linked.
CO5 - Apply vector calculus to static electric-magnetic fields in different engineering situations.

Text Book:

1. M. N. O. Sadiku, "Elements of Electromagnetic", 4th Ed, Oxford University Press.

Reference Books:

1. W. H. Hayt and J. A. Buck, “Electromagnetic field theory”,7th edition TMH
2. Electromagnetic Field theory by Balmein and Jordan

EE-222-F **ANALOG ELECTRONICS LAB**

L T P		
0 0 2	Class Work marks	: 25
	Theory marks	: 25
	Total marks	: 50

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

Course Outcomes: To understand VI characteristics and working of various electronic devices and circuits practically.

CO1 - **Study of lab equipment's and components:** CRO, Multimeter, Function Generator, Power supply-Active, Passive Components & Bread Board.

CO2 - **P-N Junction Diode**: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.

CO3 - **Applications of PN junction diode**: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor-use of filter- ripple reduction (RC Filter)-Clipper & Clamper

CO4 - **Properties of junctions** Zener diode characteristics. Heavy doping alters the reverse characteristics. Graphical measurement of forward and reverse resistance.

CO5 - **Application of Zener diode:** Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.

EE-224-F **DIGITAL ELECTRONICS LAB**

L T P		
0 0 2	Class Work marks	: 25
	Theory marks	: 25
	Total marks	: 50

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

Course Outcomes:

The students understand practical working of flipflops, multiplexers, logic gates, counters, adder etc.

CO1 - Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of V_{cc} and ground, verification of the truth tables of logic gates using TTL ICs.
CO2 - Implementation of the given Boolean function using logic gates in both SOP and POS forms.
CO3 - Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
CO4 - Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
CO5 - Implementation of 4x1 multiplexer using logic gates.

Mini Project.

EE-226-F **COMMUNICATION SYSTEMS LAB**

L T P	Class Work marks	: 25
0 0 2	Theory marks	: 25
	Total marks	: 50

LIST OF EXPERIMENTS: (Any ten experiments)

1. Generation of DSB-SC AM signal using balanced modulator.
2. Generation of SSB AM signal
3. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
4. Frequency modulation using voltage controlled oscillator.
5. To generate a FM Signal using Varactor & reactance modulation.
6. Detection of FM Signal using PLL & foster seelay method..
7. To Study Super heterodyne AM receiver and measurement of receiver parameters viz. sensitivity, selectivity & fidelity.
8. To study the circuit of PAM/PWM/PPM modulator & Demodulator
9. Study of Frequency Division Multiplexing/Demultiplexing with sinusoidal & audio inputs.
10. Generation & study of Analog TDM at least 4 channels.
11. Study of 4 channel Time Division Multiplexing system.
12. Study of pulse code modulation and demodulation with parity & Hamming code .
13. Study pulse data coding & Decoding techniques for various formats .
14. Study of ASK, FSK modulator and demodulator. 15.

Study of PSK & QPSK modulator and demodulator.

Course Outcome:-

CO1 - Gained the fundamental knowledge about communication system and modulation techniques practically.

CO2 - Will able to plan and engineer any communication link between two stations commercially.

CO3 - will be able to practically study FDM/TDM/ASK/FSK/PSK/QPSK.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

MATH-204 –F NUMERICAL METHODS OF COMPUTATIONAL PROGRAMMING LAB

L	T	P
1	1	2

Class Work marks : 25
Theory marks : 25
Total marks : 50

THIS LAB IS DESIGNED IN manner where every lab will have first hour as lecture on Numerical methods and followed by 2 hours of programming Lab.

THEORY TO BE TAUGHT

Interpolation and curve fitting : Interpolation problem, Lagrangian polynomials, Divided differences, Least square approximations.

Non-Linear Equations : Bisection method, Linear Interpolation methods, Newton's method, Muller's method, fixed-point method.

Simultaneous Linear Equations : Elimination method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method.

Numerical Solution of Ordinary Differential Equations : Taylor series method, Euler and modified Euler method, Runge-Kutta methods, Milne's method, Adams-Moulton method, Power method for Eigen values by iteration.

Numerical Solution of Partial Differential Equations : Finite difference approximations of partial derivatives, solution of Laplace equation

TEXT BOOKS :

1. Phillips - Theory & Applications & Numerical analysis, Elsevier
2. Applied Numerical Analysis : Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
3. Numerical Methods By Babu Ram, Pearson.
4. Numerical Method : E. Balagurusamy T.M.H.

REFERENCE BOOKS:

1. Numerical Methods in Engg. & Science: B.S. Grewal.

LAB SESSION (ANY TEN PROGRAMM TO BE DEVELOPED)
WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C/C++

1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Newton's method.
3. Curve fitting by least - square approximations.
4. To solve the system of linear equations using Gauss- Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jorden method.
7. To Integrate numerically using Trapezoidal rule.
8. To Integrate numerically using Simpson's rules.
9. To find the largest eigen value of a matrix by power-method.
10. To find numerical solution of ordinary differential equations by any one methods Euler's/ Runge-Kutta method.
11. To find the numerical solution of Laplace equation.
12. Department specific problem given by lecturer.

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

Course Outcomes

Students would be able to

CO1 - Evaluate numerical differentiation and numerical integration using iterative methods.

CO2 - To find the solution of transcendental and linear equation using several numerical methods

CO3 - Solve ordinary and partial differential equations of first order using several numerical Technique

GP-202 F **GENERAL PROFICIENCY**

L. T. P **Marks for Class Work ;50**
- - 2 **Total Marks: 50**

Quiz & Aptitude Comprehension

Communication for Specifics Lets Speak

Composition Sills – Instead of the given content we should teach the students formal letter writing based on the trends in practice in corporate culture.

Training on etiquettes & manners should be carried further and should be observed during the general classes, if required, even the faculty should imparted some training on the same.

Course Outcomes

CO1 - Student will be try to perform well not only for academic performance.

CO2 – Student will be able to participate in activities like games and other extracurricular activities

CO3 – Student will be able to write technical paper, presentation and participate in competitions.

M.D UNIVERSITY

SCHEME OF STUDIES AND EXAMINATION

BTech. III YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)

SEMESTER V

Modified 'F' Scheme effective from 2011-12

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
EE-301-F	COMMUNICATION Engg.	3	1	-	4	50	100	-	150	3
EE-303-F	ELECTRONIC MEASUREMENT & INSTRUMENTATION (EL,EI,IC,EE,EEE,AEI)	3	1	-	4	50	100	-	150	3
EE-305-F	ANALOG ELECTRONIC CIRCUITS (EL,EI,IC,EE,EEE,AEI)	3	1	-	4	50	100	-	150	3
EE-307-F	ANTENNAS,WAVE PROPAGATION& TV Engg.	3	1	-	4	50	100	-	150	3
CSE-210-F	COMPUTER ARCHITECTURE AND ORGANISATION (EL,EI,IC,Common with IV sem. CSE,IT)	3	1	-	4	50	100	-	150	3
EE-309-F	MICROPROCESSORS AND INTERFACING (EL,EI,IC,CSE,IT,EEE,AEI)	3	1	-	4	50	100	-	150	3
EE-323-F	ELECTRONIC MEASUREMENT & INSTRUMENTATION LAB (EL,EI,IC,EE)	-	-	2	2	25	-	25	50	3
EE-325-F	ANALOG ELECTRONIC CIRCUITS LAB (EL,EI,IC)	-	-	2	2	25	-	25	50	3
EE-329-F	MICROPROCESSORS AND INTERFACING LAB (EL,EI,IC,CSE,IT,EEE,AEI)	-	-	2	2	25	-	25	50	3
EE-335-F	PRACTICAL TRAINING		-	2	2		-			
GPECE301-F	GERNERAL PROFICIENCY					50			50	3
	TOTAL	**18**	**6**	**8**	**32**	**425**	**600**	**75**	**1100**	

Note:

2. **Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
3. **Assessment of Practical Training-I, undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of practical training obtained by the student from the industry. According to performance letter grades A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.**

EE-301-F **COMMUNICATION ENGINEERING**

L	T	P		
3	1	-	Theory	: 100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks

Duration of Exam : 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

SPECTRAL ANALYSIS :

Fourier Series, Fourier transforms, Convolution Theorem, Correlation, Cross-Correlation and autocorrelation.

Section-B

INFORMATION THEORY :

Introduction to information and entropy, channel capacity for discrete and continuous channels, Shannon's Theorem, Shannon-Hartley Theorem, Noisy channels, coding theory : Shannon-Fano coding, minimum redundance coding, maximization of entropy of a continuous message transmission rate, effect of medium on the information, selection of channels ,effect of noise and its minimization.

Section-C

RANDOM SIGNAL THEORY :

Representation of random signals, concept of probability, probability of joint occurrence, conditional probability,
discrete probability theory, continuous random variables, probability distribution function, probability density
function, joint probability density functions.

Section-D

RANDOM SIGNAL THEORY :

Statistical average and moments, Ergodic processes,
correlation Function, power spectral density, central limit theory, response of linear system to random signals. Error function
Covariance relation among the spectral densities of the two input-output random processes. Cross spectral densities, optimum filters. Introduction to Linear Block Code abd cyclic Codes

Course Outcomes:

CO1 - Use of different modulation and demodulation techniques used in analog communication
CO2 - Identify and solve basic communication problems
CO3 - Analyze transmitter and receiver circuits
CO4 - Compare and contrast design issues, advantages, disadvantages and limitations of analog communication systems

TEXT BOOK :

1. Principles of Communication Systems : Taub Schiling;

TMH REFERENCE BOOKS.

1. Communication Systems : Singh and Sapre ; TMH

2. Communication Systems : A Bruce Carlson; TMH

EE-303-F **ELECTRONIC MEASUREMENT AND INSTRUMENTATION**

L T P
3 1 -

Theory : 100 Marks
Class work : 50 Marks
Total : 150 Marks
Duration of Exam : 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

OSCILLOSCOPE:
Block diagram, study of various stages in brief, high frequency CRO considerations measurement of phase &frequency,electrostatic deflection,dual trace &dual beam oscilloscope Sampling and storage oscilloscope .

Section-B

ELECTRONIC INSTRUMENTS:
Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements,
introduction to digital meter,chopper amplifier type voltmeter,true RMS voltmeter,electronic multimeter

Section-C

GENERATION & ANALYSIS OF WAVEFORMS:
Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers,
spectrum analyser, Harmonic analyser, FFT analyser
FREQUENCY & TIME MEASUREMENT:
Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter,

Section-D

TRANSDUCERS & SIGNAL CONDITIONING:
Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.
DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

Course Outcomes:

Learner will be able to:

CO1 - Understand operation of different instruments.

CO2 - Use oscilloscope to determine frequency and phase of a sinusoidal signal

CO3 - Understand the principles of various types of transducers and sensors.

TEXT BOOK:

3. A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS.

1. Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

EE-305-F **ANALOG ELECTRONIC CIRCUITS**

L	T	P		
3	1	-	Theory	: 100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

SINGLE AND MULTISTAGE AMPLIFIERS:

Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier . FEEDBACK AMPLIFIERS :

Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

Section-B

OSCILLATORS:

Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, general form of oscillator circuit, wien-bridge oscillator, crystal oscillator.

Section-C

POWER AMPLIFIERS:

Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

OPERATIONAL AMPLIFIERS :

Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

Section-D

LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :

Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :

Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators , Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

COURSE OUTCOMES:

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

CO1 - To understand Concept of multistage amplifier and the frequency response of MOSFET and BJT amplifiers.

CO2 - Feedback concepts and construct feedback amplifiers and oscillators. Also summarizes its performance parameters.

CO3 - Explain about power amplifiers and its types and also analyze its characteristics.

CO4 - Understand the basics of op-amps and its applications.

TEXT BOOK:

7. Agarwal - Foundations & Analog & digital electronics,Elsevier
8. Integrated Electronics: Milman Halkias, TMH.
9. Microelectronic Circuits : Sedra & Smith.

REFERENCE BOOKS:

1. Operational Amplifiers:Gaikwad
2. Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH

EE-307-F **ANTENNAS, WAVE PROPOGATION &TV ENGINEERING**

L	T	P		
3	1	-	Theory	: 100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks

Duration of Exam : 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Retarded potential, field of short dipole, Antenna pattern & antenna parameters Antenna pattern, Gain, Directivity, Radiation resistance, Aperture, Beam-width etc, Reciprocity theorem for antenna.

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Section-B

Wave equation for radiated fields from current and voltage sources in terms of electric scalar potential and magnetic vector potential .Fields and pattern of an infinitesimal dipole. Definition of various potentials used in
antenna theory .:
Relation between current distribution and field pattern of an antenna, linear antenna, half wave dipole, Antenna
impedance, Directivity, Radiation resistance, Directional properties, Effect of ground on antenna pattern, Input
impedance Broad band matching.

Section-C

Two element array, broad side, End fired pattern, Beam width pattern multiplication, multi element array and their properties, Synthesis of an array.parabolic feed antena, conical, helix, log periodic, horn, Microwave antenna ground waves propagation, Space waves propagation, Effect of Earth, Duct formation, Ionosphere, and sky wave

Section-D

TELEVISION SYSTEM:
Picture transmission, sound transmission, picture reception, sound reception synchronization, receiver controls,
color television. Monochrome picture tube, Beam deflection, screen phosphor, face plate, picture tube characteristics, picture tube,circuit controls. Television Camera Tubes: Basic principal, Image orthicon, Vidicon.

Course Outcomes (COs)

CO1 Define various antenna parameters
CO2 Analyze radiation patterns of antennas
CO3 Evaluate antennas for given specifications.
CO4 Illustrate techniques for antenna parameter measurements
CO5 To understand the various applications of antennas

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TEXT BOOKS :

1. Antennas by J.D.Kraus, TMH.
4. Antenna & Wave Propagation by K.D Prasad.
5. Monochrome and Color Television : R.R.Gulati ; New Age.

CSE- 210E

COMPUTER ARCHITECTURE & ORGANIZATION

L	T	P		
3	1	-	Class Work:	50
			Exam:	100
			Total:	150

Duration of Exam: 3 Hrs.

NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section A

Boolean algebra and Logic gates, Combinational logic blocks(Adders, Multiplexers, Encoders, de-coder), Sequential logic blocks(Latches, Flip-Flops, Registers, Counters) Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.

Section B

Instruction Set Architecture:

Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid); Language of the machine: 8086 ; simulation using MSAM.

Section C

Basic non pipelined CPU Architecture and Memory Hierarchy & I/O Techniques CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining.

The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations.

Section D

Introduction to Parallelism and Computer Organization [80x86]:

Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl's law; Instruction level parallelism (pipelining, super scaling –basic features); Processor level parallelism (Multiprocessor systems overview).

Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro-program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy.

Course Outcomes:

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

CO1 - Design a circuit for any digital function

CO2 - Use K-map for simplification of Boolean expressions

CO3 - Identify the addressing modes of instructions and calculation of effective address

CO4 - Determine which hardware blocks and control lines are used for different instructions Classify the parallel processors.

Text Books:

Patterson - Computer Organization & design, Elsevier

Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.

Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.

Reference Books:

Operating Systems Internals and Design Principles by William Stallings,4th edition,

EE-309-F Microprocessors and Interfacing

L	T	P
3	1	-

Theory : 100 Marks
Class work : 50 Marks
Total : 150 Marks
Duration of Exam : 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

PART A

THE 8085 PROCESSOR :

Introduction to microprocessor, 8085 microprocessor : Architecture, instruction set, interrupt structure, and Assembly language programming.

PART B

THE 8086 MICROPROCESSOR ARCHITECTURE :

Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals

PART C

INSTRUCTION SET OF 8086 :

Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

PART D

INTERFACING DEVICE :

8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.

COURSE OUTCOMES: After the completion of the course the student will be able to:

CO1 - Understand the operation and architecture of Intel 8085 microprocessor including Instruction Set Architecture, assembly language programming, timing and speed of operation.
CO2 - Learn the operation of circuits for user interaction through switches, keyboard and display devices.
CO3 - Understand the operation and architecture of Intel 8086 microprocessor including Instruction Set Architecture, assembly language programming, timing and speed of operation.
CO4 - Understand the motivation and need for peripheral operations circuits for digital data exchange, timer, serial communication, merits of direct memory access, interrupt controller and other circuits.

TEXT BOOKS :

5. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
6. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

REFERENCE BOOKS:

1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

EE-323-F ELECTRONIC MEASUREMENT AND INSTRUMENTATION-LAB

L T P		
0 0 2	CLASS WORK :	25
	EXAM :	25
	TOTAL:	50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS:

1) Study blocks wise construction of a analog oscilloscope & Function generator.
2) Study blocks wise construction of a Multimeter & frequency counter.
3) Study Measurement of different components & parameters like Q of a coil etc using LCRQ meter.
4) Study of distortion factor meter and determination of the % distortion of the given oscillator
5) Determine output characteristics of a LVDT and Measure displacement using LVDT
6) Study characteristics of temperature transducer like Thermocouple, Thermistor & RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
7) Measurement of Strain using Strain Guage.
8) To study differential pressure transducer & signal conditioning of output signal.
9). Measurement of level using capacitive transducer..
3. Study of Distance measurement using ultrasonic transducer.

Course Outcome:

After successful completion of the course, student will be able to

CO1 - develop an understanding of construction and working of different measuring instruments

CO2 - develop an understanding of different type of interferences, its causes and methods for its reduction

CO3 - develop an understanding of construction and working of different AC and DC bridges and its applications

CO4 - develop an ability to use measuring instruments and AC and DC bridges for measurement

Note: Any Eight Experiments should performed from above list and two experiments can be suitably chosen on the contemporary topics

ANALOG ELECTRONIC CIRCUITS LAB

EE-325-F

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS: (Select Any ten Experiments)

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.
2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth
3. Study the effect of voltage series, current series, voltage shunt, and current shunt feed-back on amplifier using discrete components.
4. Design & realize inverting amplifier, non-inverting and buffer amplifier using 741 Op Amp.
5. Verify the operation of a differentiator circuit using 741 op amp and show that it acts as a high pass filter.
6. Verify the operation of a integrator circuit using 741 op amp and show that it acts as a low pass filter.
7. Design and verify the operations of op amp adder and subtractor circuits.
8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.
9. Study of IC 555 as astable & monostable multivibrator
10. Design & realize using op amp 741, Wein -bridge oscillator.
11. To design & realize using op amp 741, square wave generator.
12. To design & realize using op amp 741, logarithmic amplifier & VCCS.
13. Study of 8 bit monolithic Analog to digital converter
14. Study of R-2R ladder network & 8 bit monolithic Digital to Analog Converter.

Course Outcome:

At the end of the course the students can able to

CO1 - Measure voltage, frequency and phase of any waveform using CRO.

CO2 - Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.

CO3 - Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc

Microprocessor & Interfacing Lab

EE-329-F

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM	:	3 HRS

List of Experiment

ANY TEN EXPERIMENTS SHOULD BE PERFORMED:

6. Write a program using 8085 for Hexadecimal addition & subtraction of two numbers.
7. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers
8. Write a program to perform multiplication and division of two 8 bit numbers using 8085
9. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double Word division and verify.
5. Write a program using 8086 for finding the square root of a given number and verify.
6. Write a program using 8086 to copy 12 bytes of data from source to destination & verify.
7. Write a program to find maximum and minimum from series using 8086.
8. Write a program to initiate 8251 and to check the transmission and reception of character.
9. Write a program to interface ADC & DAC with 8085 & demonstrate generation of square wave.
10. Write a program to control the operation of stepper motor using 8085/8086 and 8255 PPI.
11 Write a program to interface 8X8 LED Matrix Display using 8085/8086 microprocessors and 8255 PPI.
12. Write a program to control the traffic light system using 8085/8086 and 8255 PPI.
13. Write a program to control simulated elevator 8085/8086 microprocessors and 8255 PPI.

COURSE OUTCOMES:

Upon completing the course, the student will be :

CO1 - Familiar with the instruction set of 8085 and 8086.

CO2 - To provide interfacing of 8085 with 8255 etc

CO3 - To write program using the micro processors.

CO4 - To use the different microprocessor kits.

CO5 - To evaluate several applications of Microprocessor.

M.D UNIVERSITY,ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.Tech. III YEAR (ELECTRONICS & COMMUNICATION ENGINEERING)

SEMESTER - VI

Modified 'F' Scheme effective from 2011-12

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
EE-302-F	MICROWAVE AND RADAR ENGINEERING	3	1	-	4	50	100	-	150	3
EE-304--F	CONTROL SYTEMS ENGG. (EL,EE, EEE)	3	1	-	4	50	100	-	150	3
EE-306-F	VLSI Design	3	1	-	4	50	100	-	150	3
IT-305-F	COMPUTER NETWORKS	3	1	-	4	50	100	-	150	3
EE-310-F	DIGITAL SYSTEM DESIGN (EL,EI, IC,EE,CSE, AEI)	3	1	-	4	50	100	-	150	3
EE-308-F	MICROCONTROLLER & EMBEDDED SYSTEM	3	1	-	4	50	100	-	150	3
EE-328-F	MICROCONTROLLER & EMBEDDED SYSTEM LAB	-	-	2	2	25	-	25	50	3
EE-326-F	DIGITAL SYSTEM DESIGN LAB (EL,EI, IC,EE,CSE, AEI)	-	-	2	2	25	-	25	50	3
EE-322-F	MICROWAVE AND RADAR LAB	-	-	2	2	25	-	25	50	3
EE-324-F	CONTROL SYTEMS ENGG. LAB (EL,EE, EEE,AEI)		-	2	2	25	-	25	50	3
	TOTAL	**18**	**6**	**8**	**32**	**400**	**600**	**100**	**1100**	

NOTE:

4. **Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator will not be permitted in the examination.**
5. **Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the VII semester.**

EE-302-F **MICROWAVE AND RADAR ENGINEERING**

L	T	P
3	1	-

Theory : 100 Marks
Class work : 50 Marks
Total : 150 Marks
Duration of Exam : 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

WAVEGUIDES: Introduction, comparison with transmission lines, propagation in TE & TM mode, rectangular wave guide, TEM mode in rectangular wave guide, characteristic impedance, introduction to circular waveguides and planar transmission lines.

Section-B

MICROWAVE COMPONENTS &TUBES :Directional couplers, tees, hybrid ring, S-parameters, attenuators, cavity resonators ,mixers & detectors, matched Load, phase shifter ,wave meter, Ferrite devices: Isolators, circulators.
Limitation of conventional tubes; Construction, operation and properties of Klystron amplifier, reflex Klystron,
magnetron, TWT , BWO , crossed field amplifiers.

Section-C

MICROWAVE SOLID STATE DEVICES & MEASUREMENTS: Varactor diode, Tunnel diode, Schottky diode, GUNN diode, IMPATT, TRAPATT and PIN diodes. MASER, parametric amplifiers .Power measurement using calorimeter & bolometers measurement of SWR, frequency , wavelength and impedance. Microwave bridges.

Section-D

RADAR : Block Diagram and operation, Radar Frequencies, Simple form of Radar Equation, Prediction of Range
Performance, Pulse Repetition frequency and Range Ambiguities, Applications of Radar

COURSE OUTCOMES (CO)

After the completion of course the students will abel to;

CO1 - Helping the students to gain insight into the subject, to develop suitable hardware/software that addresses the industrial/social problems effectively.
CO2 - Knowledge about Microwave Solid State Devices.
CO3 - Ability to identify and study the performance of Wave Guides and Resonators

CO4 - Study the performance of various components used in microwave engineering.
CO5 - Designing of Microwave filters.

TEXT BOOKS:

1. Microwave devices and circuits :Samuel Liao;PHI
2. Microwave devices & Radar Engg :M .Kulkarni;Umesh

REFERENCE BOOK :

1. Microwaves and Radar : A.K. Maini; Khanna

EE-304-F

CONTROL SYSTEM ENGINEERING

L	T	P	Theory	: 100 Marks
3	1	-	Class work	: 50 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTORY CONCEPTS :System/Plant model, types of models, illustrative examples of plants and their inputs and outputs, controller servomechanism, regulating system, linear time-invariant (LTI) system, time-varying system, causal system, open loop control system, closed loop control system, illustrative examples of open-loop and feedback control systems, continuous time and sampled data control systems. Effects of feedback on sensitivity (to parameter variations),stability, external disturbance (noise), overall gain etc. Introductory remarks about non-linear control systems.

Section-B

MATHEMATICAL MODELLING : Con**c**ept of transfer function, relationship between transfer function and impulse response, order of a system, blockdiagram algebra, signal flow graphs : Mason's gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems. Transfer functions of cascaded and non-loading cascaded elements. Introduction to state variable analysis and design.

Section-C

TIME DOMAIN ANALYSIS : Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, relationship between location of roots of characteristics equation, w and wn, time domain specifications of a general and an under-damped 2nd order system, steady state error and error constants, dominant closed loop poles, concept of stability, pole zero configuration and stability, necessary and sufficient conditions for stability Hurwitz stability criterion Routh stability criterion and relative stability.
Root locus concept, development of root loci for various systems, stability considerations..

Section-D

FREQUENCY DOMAIN ANALYSIS , COMPENSATION & CONTROL COMPONENT :Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.
Necessity of compensation, compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers, illustrative examples.
Synchros, AC and DC techo-generators, servomotors, stepper motors, & their applications, magnetic amplifier.

COURSE OUTCOMES:

CO1 - To understand the open loop and closed loop (feedback) systems.
CO2 - To understand time domain and frequency domain analysis of control systems required for stability analysis.
CO3 - To understand the compensation technique that can be used to stabilize control systems.

TEXT BOOK :

1. . Control Systems :Anuj Jain & Naveen mehra vayu education

2.Control Systems - Principles & Design : Madan Gopal; Tata Mc Graw Hill.
3. Control System Engineering : I.J.Nagrath & M.Gopal; New Age

REFERENCE BOOKS :

1. Automatic Control Systems : B.C.Kuo, PHI.
2. Modern Control Engg : K.Ogata; PHI.

EE-310-F **DIGITAL SYSTEM DESIGN**

L	T	P		
3	1	-	Theory	: 100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

. INTRODUCTION :Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL data objects, classes and data types, Operators, Overloading, logical operators. Types of delays Entity and Architecture declaration. Introduction to behavioral dataflow and structural models.

Section-B

VHDL STATEMENTS : Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements. Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

Section-C

COMBINATIONAL & SEQUENTIAL CIRCUIT DESIGN:VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders , code converters, comparators, implementation of Boolean functions etc. VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

Section-D

DESIGN OF MICROCOMPUTER & PROGRAMMABLE DEVICE : Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL Programmable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

COURSE OUTCOMES: After the completion of the course the student will be able to:

CO1 - Foster ability to identify and code the module using different modelling styles.

CO2 - Foster ability to write test benches in VHDL.

CO3 - Acquired knowledge about combinational circuit and sequential circuits and how to code it.

CO4 - Ability to develop synthesizable code in VHDL

REFERENCE BOOKS:

1. Ashenden - Digital design,Elsevier
2. IEEE Standard VHDL Language Reference Manual (1993).
3. Digital Design and Modelling with VHDL and Synthesis : KC Chang; IEEE Computer Society Press.
4. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
5. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
6. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
7. VHDL-IV Edition :Perry; TMH (2002)
8. "Introduction to Digital Systems" : Ercegovac. Lang & Moreno; John Wiley (1999).

9. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
10. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).
11. Grout - Digital system Design using FPGA & CPLD 'S,Elsevier

IT-305-F **COMPUTER NETWORKS**

L	T	P		
3	1	-	Theory	:100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions

Section-A

OSI Reference Model and Network Architecture: Introduction to Computer Networks, Example networks ARPANET, Internet, Private Networks, Network Topologies: Bus-, Star-, Ring-, Hybrid -, Tree -, Complete -, Irregular –Topology; Types of Networks : Local Area Networks, Metropolitan Area Networks, Wide Area Networks; Layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer

Section-B

TCP/IP: Introduction, History of TCP/IP, Layers of TCP/IP, Protocols, Internet Protocol, Transmission Control Protocol , User Datagram Protocol, IP Addressing, IP address classes, Subnet Addressing, Internet Control Protocols, ARP, RARP, ICMP, Application Layer, Domain Name System, Email – SMTP, POP,IMAP; FTP, NNTP, HTTP, Overview of IP version 6.

Section-C

Local Area Networks: Introduction to LANs, Features of LANs, Components of LANs, Usage of LANs, LAN Standards, IEEE 802 standards, Channel Access Methods, Aloha, CSMA, CSMA/CD, Token Passing, Ethernet, Layer 2 & 3 switching, Fast Ethernet and Gigabit Ethernet, Token Ring, LAN interconnecting devices: Hubs, Switches, Bridges, Routers, Gateways.

Wide Area Networks: Introduction of WANs, Routing, Congestion Control, WAN Technologies, Distributed Queue Dual Bus (DQDB),

Section-D

Synchronous Digital Hierarchy (SDH)/ Synchronous Optical Network (SONET), Asynchronous Transfer Mode (ATM), Frame Relay.,Wireless Links.

Introduction to Network Management: Remote Monitoring Techniques: Polling, Traps, Performance Management, Class of Service, Quality of Service, Security management, Firewalls, VLANs, Proxy Servers, Introduction to Network Operating Systems: Client-Server infrastructure, Windows NT/2000.

Learning Outcomes:

By the end of the course the students will be able to:

CO1 - Independently understand basic computer network technology.

CO2 - Understand and explain Data Communications System and its components.

CO3 - Identify the different types of network topologies and protocols.

CO4 - Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

CO5 - Identify the different types of network devices and their functions within a network

Text Book:

Computer Networks (3rd edition), Tanenbaum Andrew S., International edition, 1996.

Reference Books:

Data Communications, Computer Networks and Open Systems (4th edition), Halsall Fred, 2000, Addison Wesley, Low Price Edition.

Business Data Communications, Fitzgerald Jerry,.

Computer Networks – A System Approach, Larry L. Peterson & Bruce S. Davie, 2nd Edition

Computer Networking – ED Tittel , 2002, T.M.H.

EE-306-F **VLSI DESIGN**

L	T	P		
3	1	-	Theory	:100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

BASIC MOS TRANSISTOR : Enhancement mode & Depletion mode – Fabrication (NMOS, PMOS, CMOS, BiCMOS) Technology – NMOS transistor current equation – Second order effects – MOS Transistor Model.

Section-B

NMOS & CMOS INVERTER AND GATES : NMOS & CMOS inverter – Determination of pull up / pull down ratios – Stick diagram – Lamda based rules – Super buffers – BiCMOS & steering logic.

Section-C

SUB SYSTEM DESIGN & LAYOUT: Structured design of combinational circuits – Dynamic CMOS & clocking – Tally circuits – (NAND-NAND, NOR-NOR and AOI logic) – EXOR structure – Multiplexer structures – Barrel shifter.

Section-D

DESIGN OF COMBINATIONAL ELEMENTS & REGULAR ARRAY LOGIC : NMOS PLA – Programmable Logic Devices - Finite State Machine PLA – Introduction to FPGA**.**

VHDL PROGRAMMING: RTL Design – Combinational logic – Types – Operators – Packages – Sequential circuit – Sub-programs – Test benches. (Examples: address, counters, flipflops, FSM, Multiplexers / De-multiplexers).

COURSE OUTCOMES:

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

CO1 - To understand basics of MOS devices CMOS fabrication and basis building blocks

CO2 - To understand circuit design process

CO3 - Design combinational and sequential circuits using CMOS gates

CO4 - To understand Programmable logic devices using CMOS

CO5 - To understanding of RTL Model By using VHDL

TEXT BOOKS

4. D.A.Pucknell, K.Eshraghian, 'Basic VLSI Design', 3rd Edition, Prentice Hall of India, New Delhi, 2003.
5. Introduction to Digital Integrated Circuits : Rabaey,Chandrakasan & Nikolic.

6. Principles of CMOS VLSI Design : Neil H.E. Weste and Kamran Eshraghian; Pearson.

REFERENCE BOOKS

1. N.H.Weste, 'Principles of CMOS VLSI Design', Pearson Education, India, 2002
2. VLSI Technology: S.M. Sze; McGraw-Hill.

EE-308-F **Microcontroller and Embedded Systems**

L	T	P		
3	1	-	Theory	: 100 Marks
			Class work	: 50 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION OF MICROCONTROLLER: Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton , CISC V/S RISC; microcontrollers memory types; microcontrollers features : clocking, i/o pins, interrupts, timers, peripherals.

Section-B

MICROCONTROLLER ARCHITECTURE: Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

Section-C

Microcontrollers - Microcontroller 8051- Architecture, Pin Diagram, I/O Ports, Internal RAM and Registers, Interrupts, Addressing Modes, Memory Organization and External Addressing, Instruction Set, Assembly Language Programming, Real Time Applications of Microcontroller- Interfacing with LCD, ADC, DAC, Stepper Motor, Key Board and Sensors.

Section-D

Embedded Systems-Introduction, Classification, Processors, Hardware Units, Software Embedded into System, Applications and Products of Embedded Systems, Structural Units in Processor, Memory Devices, I/O Devices, Buses, Interfacing of Processor Memory and I/O Devices, Case Study of an Embedded System for a Smart Card.

COURSE OUTCOMES:

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

CO1 - To analyse and design various microcontroller types and their characteristics.

CO2 - To evaluate several applications of microcontrollers.

CO3 - To develop practical understanding, limitations and constraints of the theory they learn.

CO4 - Understand the architecture of 8051/PIC.

CO5 - To understand and study programming of 8051/AT89C51/PIC

Text Book

1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
2. Design with PIC Microcontrollers by John B. Peatman , Pearson.
3. Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.
4. V. Udayashankara and M. S. Mallikarjunaswamy: 8051 Microcontroller, TMH, New

Delhi.

References:

3. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.

4. A. V. Deshmukh: Microcontroller (Theory and Application), TMH.

5. D. V. Hall: Microprocessors and Interfacing, TMH

6. Programming and Customizing the 8051 Microcontroller : Predko ; TMH.

7. Programming Embedded Systems in C and C++ : Michael Barr; SHROFF PUB. & DISTR

EE-328-F **MICROCONTROLLER&EMBEDED SYSTEM DESIGN LAB**

L	T	P
-	-	2

Class Work: 25
Exam: 25
Total: 50
Duration of Exam: 2 Hrs.

List of Experiment:

8051/AT 89C51 microcontroller

01. Write an Assembly language Programme (ALP) to generate 10 kHz square wave.
2. To study implementation & interfacing of Display devices Like LCD, LED Bar graph & seven segment display with Microcontroller 8051/AT89C51
3. To study implementation & interfacing of Different motors like stepper motor, DC motor & servo Motors.
4. Write an ALP for temperature & pressure measurement.
5. Write a program to interface a graphical LCD with 89C51.
6. To study Programming and Transmission & reception of data through Serial port & study of Parallel printer port.

PIC Microcontroller

7. To interface PWM based voltage regulator using PIC Microcontroller .
8. Study and analysis of interfacing of Graphical LCD using PIC controller
9. Study and interfacing of IR (RC5 protocol) and RF Communication using PIC controller
10. Study of SD/MMC card Interface using 18F4550

COURSE OUTCOMES:

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

CO1 - To analyse and design various microcontroller types and their characteristics.

CO2 - To evaluate several applications of microcontrollers.

CO3 - To develop practical understanding, limitations and constraints of the theory they learn.

CO4 - Understand the architecture of 8051/PIC.

CO5 - To understand and study programming of 8051/AT89C51/PIC

EE-324-F **CONTROL SYSTEM LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

ANY SIX EXPERIEMENTS (from Sl. No1-11).

3. To study speed Torque characteristics of
   A.C. servo motor
   DC servo motor .
4. (a) To demonstrate simple motor driven closed loop DC position control system.
   (b) To study and demonstrate simple closed loop speed control system.
5. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots .
6. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing
   number of steps, direction of rotation & speed.
7. To implement a PID controller for temperature control of a pilot plant.
8. To study behavior of 1 order,2 order type 0,type 1 system.
9. To study control action of light control device.
10. To study water level control using a industrial PLC.
11. To study motion control of a conveyor belt using a industrial PLC

MATLAB BASED (ANY FOUR EXPT.)

10. Introduction to MATLAB (Control System Toolbox), Implement at least any
    Different Toolboxes in MATLAB, Introduction to Control Systems Toolbox.
    Determine transpose, inverse values of given matrix.
    Plot the pole-zero configuration in s-plane for the given transfer function.
    Plot unit step response of given transfer function and find peak overshoot, peak time.
    Plot unit step response and to find rise time and delay time.
    Plot locus of given transfer function, locate closed loop poles for different values of k.
    Plot root locus of given transfer function and to find out S, Wd, Wn at given root & to discuss stability.
    Plot bode plot of given transfer function and find gain and phase margins
    Plot the Nyquist plot for given transfer function and to discuss closed loop stability, gain and phase margin.

COURSE OUTCOMES:

CO1 - To understand the open loop and closed loop (feedback) systems.
CO2 - To understand PID controllers and its applications.
CO3 - To understand the PLC

EE-330-F **DIGITAL SYSTEM DESIGN LAB**

L T P	CLASS WORK	: 25
0 0 2	EXAM :	25
	TOTAL	50
	DURATION OF EXAM	3 HRS

LIST OF EXPERIMENTS:

ANY FIVE EXPERIMENTS: VHDL

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. half adder
   b. full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. multiplexer
   b. demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. decoder
   b. encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6 Write a VHDL program for a code converter and check the wave forms and the hardware generated
3 Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
4 Write a VHDL program for a counter and check the wave forms and the hardware generated
5 Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   register
   shift register

ANY FIVE EXPERIMENTS USING: using FPGA (Spartan 3) & CPLD

1) Design of Half-Adder, Full Adder, Half Subtractor, Full Subtractor
2) Design a parity generator
3) Design a 4 Bit comparator
4) Design a RS & JK Flip flop
5) Design a 4: 1 Multiplexer
6) Design a 4 Bit Up / Down Counter with Loadable Count
7) Design a 3: 8 decoder
8) Design a 8 bit shift register
9) Design a arithmetic unit
10) Implement ADC & DAC interface with FPGA
11) Implement a serial communication interface with FPGA
12) Implement a Telephone keypad interface with FPGA
13) Implement a VGA interface with FPGA
14) Implement a PS2 keypad interface with FPGA
15) Implement a 4 digit seven segment display

COURSE OUTCOMES:

After the completion of the lab the student will be able to:

CO1 - Foster ability to identify and code the module using different modelling styles.

CO2 - Foster ability to write test benches in VHDL.

CO3 - Acquired knowledge about combinational circuit and sequential circuits and how to code it.

CO4 - Ability to develop synthesizable code in VHDL

EE-322-F **MICROWAVE AND RADAR ENGINEERING LAB**

L T P			
0 0 2	CLASSWORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS: ANY TEN EXPERIEMNTS CAN BE SELECTED

1. Study of wave guide components.
2. To measure frequency of microwave source and demonstrate relationship among guide dimensions, free space wave length and guide wavelength.
2 To measure VSWR of unknown load and determine its impedance using a smith chart.
3 Study of characteristics of Gunn oscillator & Gunn diode as modulated source (PIN modulation) and determination of modulation depth.
4 Study of insulation & coupling coefficient of a magic T & coupling coefficient and directivity of a directional coupler
5 Measurement of attenuation of a attenuator and isolation, insertion loss, cross coupling of an circulator .
6 Study of waveguide horn and its radiation pattern and determination of the beam width.
8. To study working of MIC Components like Power Divider , Ring resonator , Filters & Microwave Amplifier
9. To study Measurement of Guide wavelength (g).,Free Space wavelength ( ). & Concept of reduction of wavelength due to substrate material
10. Measurement of SWR in a Microwave transmission line.
11. To study working of Doppler radar & measure RPM, object Counter & velocity, .
12. Study of audio & data communication over Microwave bench.
13. Measurement of microwave power using power meter.

COURSE OUTCOMES

CO1 - Helping the students to gain insight into the lab, to develop suitable hardware/software that addresses the industrial/social problems effectively.
CO2 - Knowledge about Microwave Solid State Devices.
CO3 - Ability to identify and study the performance of Wave Guides and Resonators
CO4 - Study the performance of various components used in microwave engineering.
CO5 - Designing and testing of Microwave filters.

M.D. UNIVERSITY, ROHTAK

Scheme of studies & Examination
B. Tech. (Electronics and Communication Engg.)

SEMESTER VIII

F ' Scheme Effective from 2012–2013

Training of Six Months

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
ECE-401-F	Practical Training – II	-	-	-	-	-	-		-	-
ECE-403-F	Industrial Training / Project at College Level	-	-	8	8	-	-	-	-	-
	Total			8	8					

Note:

Assessment of Practical Training-II, carried out at the end of VI semester, will be based on seminar, viva-voce and project report of the student from the industry. According to performance letter
Grades A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.

Course Outcomes:

At the end of this course the student shall be able to

CO1 have an understanding how to work in actual industry environment

CO2 utilise the technical resources

CO3 write technical/training reports

CO4 give oral presentation related to the work completed

M.D. UNIVERSITY, ROHTAK

Scheme of studies & Examination
B. Tech. (Electronics and Communication Engg.)

SEMESTER VII

F ' Scheme Effective from 2012–2013

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
ECE-402-F	WIRELESS COMMUNICATION	3	1	-	4	50	100	-	150	3
ECE-404-F	SATELITE COMMUNICATION ENGINEERING	3	1	-	4	50	100	-	150	3
ECE-406-F	DATA COMMUNICATION	3	1	-	4	50	100	-	150	3
ECE-416-F	OPTICAL COMMUNICATION SYSTEMS	3	1	-	4	50	100	-	150	3
	*Dept Elective-I	3	1	-	4	50	100	-	150	3
ECE-408-F	Digital Signal Processing	3	1	-	4	50	100	-	150	3
ECE-424-F	Wireless & Satellite Communication Lab			3	3	50	-	50	100	3
ECE-428-F	Digital Signal Processing Lab	-	-	2	2	25	-	25	50	3
ECE-430-F	Data Communication Lab	-	-	3	3	50	-	50	100	3
GFEE-402-F	General Fitness For The Profession	-	-	-	-		-	50	50	3
	TOTAL	**19**	**5**	**8**	**32**	**425**	**600**	**175**	**1200**	

List of Dept Electives-I

ECE-410-F	Mobile Communication
EE-317-F	Power Electronics
IC-404-F	Fuzzy Logic Control
ECE-462-F	Genetic Algorithms & Applications
ECE-454-F	Radar and Sonar Engg.
EE-406-F	Advance Control System
ECE-412-F	Wireless Sensor Network
ECE-414-F	Image Processing

Note:

4. **Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
5. ***Student will be permitted to opt for any one elective run by the other departments. However, the departments will offer only those electives for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise.**
6. **A team consisting of Principal/Director, HOD of concerned department and external examiner appointed by University shall carry out the evaluation of the student for his/her General Fitness for the Profession.**

ECE-402-F **WIRELESS COMMUNICATION**

L T P **Class Work : 50**

3 1 - **Exam : 100**

Total : 150

Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS: Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

MODERN WIRELESS COMMUNICATION SYSTEMS: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.

Section-B

INTRODUCTION TO CELLULAR MOBILE SYSTEMS: Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. CELLULAR SYSTEM DESIGN FUNDAMENTALS: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity.

Section-C

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

Section-D

WIRELESS NETWORKING: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks.

INTELLIGENT CELL CONCEPT AND APPLICATION: Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

Course Outcomes:

CO1 - To understand the basics of Wireless Communication Networks.\

CO2 - To motivate the students to pursue research in the area of wireless communication.

CO3 – To understand the basic concepts of wireless networking and intelligent cells.

TEXT BOOKS:

10. Wireless Communications: Theodore S. Rappaport; Pearsons.

11. Mobile Cellular Telecommunication: W.C.Y.Lee;
McGraw Hill REFERENCE BOOK:
Mobile Communications: Jochen Schiller; Pearson

ECE-404-F SATELLITE COMMUNICATION ENGINEERING

L T P	Class Work : 50
3 1 -	Exam : 100
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

PRINCIPLES OF SATELLITE COMMUNICATION: Evolution & growth of communication satellite, Synchronous satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite, Modem & Codec. Applications of satellite communication.

COMMUNICATION SATELLITE LINK DESIGN: Introduction, General link design equations, System noise temperature, C/N & G/T ratio, Atmospheric & Ionospheric effects on link design, Complete link design, Earth station parameters.

Section-B

ANALOG SATELLITE COMMUNICATION : Introduction, Baseband analog(Voice) signal, FDM techniques, S/N & C/N ratio in frequency modulation in satellite link, S/N ratio in FM with multiplexed telephone signal in satellite link, Single channel per carrier(SCPC) systems, Companded single sideband (CSSB) systems, Analog FM/FDM TV satellite link, Intermodulation products & their effects in FM/FDM systems, Energy disposal in FM/FDM systems.

DIGITAL SATELLITE COMMUNICATION : Advantages of digital communication, Elements of digital satellite communication systems, Digital baseband signals, Digital modulation techniques like MSK,GMSK/, QAM ,Satellite digital link design, Time Division Multiplexing.

Section-C

MULTIPLE ACCESS TECHNIQUES: Introduction, TDMA, TDMA-Frame structure, TDMA-Burst structure, TDMA-Frame efficiency, TDMA-superframe, TDMAFrame acquisition & Synchronization, TDMA compared to FDMA, TDMA Burst Time Plan, Multiple Beam (Satellite switched) TDMA satellite system, Beam Hopping(Transponder Hopping) TDMA, CDMA & hybrid access techniques.

SATELLITE ORBITS: Introduction, Synchronous orbit, Orbital parameters, Satellite location with respect to earth, Look angles, Earth coverage & slant range, Eclipse effect, Satellite placement in geostationary orbit, station keeping, Satellite stabilization.

Section-D

]SPECIAL PURPOSE COMMUNICATION SATELLITES : BDS, INMARSAT, INTELSAT, VSAT(data broadband satellite), MSAT(Mobile Satellite Communication technique), Sarsat (Search & Rescue satellite) & LEOs (Lower earth orbit satellite), Satellite communication with respect to Fiber Optic Communication, LANDSAT, Defense satellite.

LASER SATELLITE COMMUNICATION: Introduction, Link analysis, Optical satellite link transmitter, Optical satellite link receiver, Satellite Beam Acquisition, Tracking & Positioning, Deep Space Optical Communication Link.

COURSE OUTCOMES: After the completion of the course the student will be able to:

CO1 - This course is helpful for students to understand the working of satellite in space.

CO2 - This course is very helpful to understand orbital parameters of satellite in space.

CO3 - The course makes aware about various satellites working in space with their specific applications.

CO4 - This course prepares students to take advanced courses in the related fields and finally equips them to take up R&D in Satellite and space communication.

TEXT BOOK:

1. Satellite Communication : D.C. Aggarwal ; Khanna.

REFERENCE BOOK :

1. Satellite Communication :Gagliardi ; CBS

ECE-406-F **DATA COMMUNICATION**

L T P	Class Work : 50
3 1 -	Exam : 100
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

DIGITAL COMMUNICATION: Introduction, digital communication, Shannon limit for information capacity,digital radio, digital amplitude modulation, frequency shift keying (FSK), phase shift keying (PSK), quadrature amplitude modulation (QAM), band width efficiency, carrier recovery, differential phase shift keying,(DPSK), clock recovery, probability of error & bit error rate, trellis encoding.

Section-B

DATA COMMUNICATIONS: Introduction, history of data communication, standard organization for data communication, data communication circuits, data communication codes, error control, synchronization, data communications hardware, serial interfaces: RS-232, RS-449 & RS-530, CCITT X.21, parallel interfaces: centronics parallel interfaces. the telephone network: DDD network, private- line service, the telephone circuit, data modems: synchronous modems, asynchronous modems, modem synchronization.

Section-C

DATA COMMUNICATIONS PROTOCOLS AND NETWORK CONFIGURATIONS : Introduction, open system interconnection (OSI), data transmission mode,asynchronous protocols, synchronous protocols, public data network, integrated services digital network (ISDN), local area networks, token pass ring, Ethernet. RFID Technology & its applications like Attendance, security ,library management etc.

Section-D

MULTIPLEXING : Introduction, time division multiplexing, T1 digital carrier system, CCITT time division multiplexed carrier systems, CODECS, COMBO chips, line encoding, T-CARRIERS, frame synchronization, bit interleaving VS word interleaving, frequency division multiplexing, AT&T's FDM hierarchy, composite base band signal, formation of a master group.

INTERNET AND TCP/IP: Introduction, history, use of Internet, accessing the Internet, Internet addresses, security on the internet, authentication, firewalls, intranet and extranet, TCP/IP reference model, domain name service, world wide web.

COURSE OUTCOMES (CO):

CO1 - Helping the students to understand the various modulation techniques.
CO2 - Introduce the concept of , standard organization for data communication, data communication circuits, data communication codes.
CO3 - Understanding various protocols and network configurations.
CO4 - Understanding of various multiplexing Techniques and basis of internet.
CO5 - To motivate the students towards professionalism effective communication skills and team

Work.

TEXT BOOK:

6. Electronic Communications Systems (4th Ed.) : Wayne Tomasi; Pearson
7. Data Communication and Networking (2nd -edition): Forauzan;

ECE-408-F DIGITAL SIGNAL PROCESSING

L T P	Class Work : 50
3 1 -	Exam : 100
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

DISCRETE-TIME SIGNALS: Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems.

DISCRETE-TIME SYSTEMS : Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

Section-B

SAMPLING OF TIME SIGNALS: Sampling theorem, application, frequency domain representation of sampling, reconstruction of band limited signal from its samples. discrete time processing of continuous time signals, changing the sampling rate using discrete time processing.

Z-TRANSFORM : Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications of Z-transform.

Section-C

BASICS OF DIGITAL FILTERS : Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters : window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP, DSP algorithm implementation consideration. Applications of DSP.

Section-D

MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction to multirate digital signal processing, sampling rate conversion, filter structures, multistage decimator and interpolators, digital filter banks.

COURSE OUTCOMES:

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

CO1 - Possess basic background in digital signal processing area necessary for supporting subjects such as: communication principles, computer networks, speech processing, audio processing, image and video processing

CO2 - Possess necessary background for advance studies in DSP, especially for taking the subject Advanced Digital Signal Processing, or other multimedia signal processing subjects.

CO3 - Analyze the basic of properties of signals and systems like time invariance, stability, causality, linearity etc. Compute the linear and Circular convolutions of discrete time sequences.
CO4 - Understand the basic theories behind Z/FFT for practical applications.
CO5 - Understand the basic theories behind Filters such as IIR and FIR filter for practical applications

TEXT BOOKS :

7. Digital Signal Processing : Proakis and Manolakis; Pearson

8. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH

REFERENCE BOOKS:

4. Digital Signal Processing: Alon V. Oppenhelm;PHI

5. Digital Signal processing(II-Edition): Mitra, TMH

ECE-416-F OPTICAL COMMUNICATION SYSTEMS

L T P **Class Work : 50**

3- 1 -0 **Exam : 100**

Total : 150

Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question. from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION TO OPTICAL COMMUNICATION SYSTEMS : Electromagnetic spectrum used for optical communication, block diagram of optical communication system. Basics of transmission of light rays. Advantages of optical fiber communication.

Section-B

OPTICAL FIBERS: Optical fibers structures and their types, fiber characteristics : attenuation, scattering, absorption, fiber bend loss, dispersion; fiber couplers and connectors.

Section-C

LED LIGHT SOURCE : Light emitting diode : recombination processes, the spectrum of recombination radiation, LED characteristics, internal quantum efficiency, external quantum efficiency, LED structure, lens coupling to fiber, behavior at high frequencies.

LASER LIGHT SOURCE : Basic principles of laser action in semi -conductors, optical gain, lasing threshold, laser structures and characteristics, laser to fiber coupling, comparison with LED source.

Section-D

AVALANCHE AND PIN PHOTODETECTORS: Principles of optical detection, quantum efficiency, responsivity, general principles of PIN photodetector, intrinsic absorption, materials and designs for PIN photodiodes, impulse and frequency response of PIN photodiodes, noise in PIN Photodiodes, multiplication process, APD Design, APD bandwidth, APD noise.

Course Outcome:-

CO1 - Gained the fundamental knowledge about optical communication.
CO2 - Will be able to plan and engineer an optical fiber based communication link.
CO3 – will be able to understand LED and laser light sources and PIN photodetector.

TEXT BOOK:

Optical Fiber Communications: John M Senior; Pearson.

REFERENCE BOOKS :

10. Optical Communication Systems : John Gowar; PHI.

11. Optical Fiber Communications : Gerd Keiser; TMH

12. Optical fiber Communication : Selvarajan, Kar, Srinivas; TMH.

13. Optical Fiber Communication System by MK Raina, Satya Parkashan, New Delhi.

ECE-424-F WIRELESS & SATELLITE COMMUNICATION LAB

L T P	Class Work : 50
- - 2	Exam : 50
	Total : 100
	Duration of Exam : 3 Hrs.

LIST OF EXPERIMENTS:

6. To set up a satellite communication link & study of change in uplink & downlink frequency.

7. To Study Transmission of Audio & Video Signals & Data communication over satellite link .

8. To Study Transmission of telemetry data like temperature & light intensity over satellite link

9. To measure the propagation delay of signal in a Satellite communication Link.

10. To study different GPS data like longitude, latitude & different types of dilute of precision using GPS receiver..

11. To study selection of various PN codes like Gold, Barker & MLS in CDMA technology .

12. To study generation (spreading) & demodulation (Despreading) of of DSSS modulated signal

13. To study Voice communication over DSSS.

14. To study Minimum shift keying modulation & de modulation .

15. To study radiation pattern & calculate beam width for Yagi uda & Folded dipole antenna.

16. To study radiation pattern & calculate beam width for Circular & Triangular Patch Antenna.

17. to study FHSS Modulation & demodulation & transfer of numeric data.

COURSE OUTCOMES: After the completion of the course the student will be able to:
CO1 - This lab is helpful for students to understand the working of satellite.
CO2 - This Lab prepares students to take advanced courses in the related fields.
CO3 – the course equips students to take up R&D in Wireless and Satellite communication.

NOTE:

At least ten experiments are to be performed.

EE-430-E **DATA COMMUNICATION LAB**

L T P **Class Work : 25**
- - 2 **Exam : 25**
Total : 50
Duration of Exam : 3 Hrs.

LIST OF EXPERIMENTS:

4. To study different types of transmission media
5. To study Quadrature Phase Shift Keying Modulation.
6. To study Quadrature Amplitude Modulation.
7. To Study! 6 Quadrature Amplitude Multiplexing.
8. To Study Serial Interface RS-232 and its applications.
9. To study the Parallel Interface Centronics and its applications.
10. To configure the modem of a computer.
11. To make inter-connections in cables for data communication in LAN.
12. To install LAN using Tree topology.
13. To install LAN using STAR topology.
14. To install LAN using Bus topology.
15. To install LAN using Token-Ring topology
16. To install WIN NT
17. To configure a HUB/Switch.

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:
CO1 - Independently understand basic computer network technology.
CO2 - Understand and explain Data Communications System and its components.
CO3 - Identify the different types of network topologies and protocols.
CO4 - Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO5 - Identify the different types of network devices and their functions within a network

NOTE:

At least ten experiments have to be performed in the semester;
At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus .

ECE-428-F **DIGITAL SIGNAL PROCESSING LAB**

L T P
- - 2

Class Work : 25
Exam : 25
Total : 150
Duration of Exam : 3 Hrs.

LIST OF EXPERIMENTS:

Perform the experiments using DSP Hardware Processor using Programmes in C Language:

7. To understand sampling theorem & generation of waveforms like sine, square & Triangle.
8. To study Quantization technique .
9. To study PCM encoding & Hamming code generation.
10. To Study Digital modulation techniques ASK/FSK& PSK .
11. To study FIR Filter Implementation.
12. To study Auto correlation & Linear convolution.

Experiments To be performed on MATLAB

8. represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
9. To develop program for discrete convolution.
10. To develop program for discrete correlation.
11. To design analog filter(low-pass, high pass, band-pass, band-stop).
12. To design digital IIR filters(low-pass, high pass, band-pass, band-stop).
13. To design FIR filters using windows technique.

NOTE:
At least ten experiments have to be performed in the semester.

Course Outcomes

CO1 - Develop and Implement DSP algorithms in software using a computer language such as C with TMS320C6713 floating point Processor.
CO2 - Develop various DSP Algorithms using MATLAB Software package.
CO3 - Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.
CO4 - Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.
CO5 - Design and Analyze Digital Filters using FDA Tool.

ECE-410-F **MOBILE COMMUNICATION**

L T P	Class Work : 50
3 1 -	Exam : 100
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

MOBILE RADIO SYSTEM: A reference model, Frequencies for radio transnussion, Signals, Antennas, Signal Propagation, Multiplexing, Modulation

CHARACTERISTICS OF RADIO WAVES: Multipath Characteristics of radio waves signal fading, time dispersion, Doppler spread, coherence time, LCR. fading statistics. Diversty techniques

Section-B

MOBILE RADIO PROPAGATION: Mechanism, free space path loss, long distance path loss model, Okumara model, Hata model, PCS model, wideband PCS, Microcell model, Indoor propagation model, Jake's channel model.

Section-C

WIRELESS SYSTEMS: Standards – GSM,signaling & call control, mobility management, location racking wireless data services IS-95, GPRS.

WIRELESS DATA NETWORKING: IEEE Standards, Models Different layers, wireless LAN, Hypes LAN, Bluetooth. Performance analysis of link & transport layer protocols over wireless channels.

Section-D

MOBILE NETWORK LAYER: Mobile IP: Goals, assumptions & requirements, IP packet delivery, Agent discovery, Registration, tunneling and en capsulation, optimization, Reverse tunneling, IP-V6, Mobile ad-hoc networks.

MOBILE TRANSPORT LAYS: Tradition TCP, Classical TCP improvement, TCP over 2.5G/3G wireless networks. Performance enhancing proxies.

Course Outcomes (COs)

CO1: Discuss cellular radio concepts.
CO2 : Identify various propagation effects.
CO3 : To have knowledge of the mobile system specifications.
CO4 : Classify multiple access techniques in mobile communication.
CO5: Outline cellular mobile communication standards.

TEXT BOOKS:

1. Mobile Communication: II nd edition Jochen Schiller Pearson Education

REFERENCES:

12. Mobile Cellular Telecommunications: 2nd Edition: William, C Y Lee Mc Graw Hill

13. Wireless and Digital Communication: Dr. Kamilo Feher (PHI)

14. T.S. Rappaport, “Wireless Communication, Principles & Practice”, Pearson

EE-317-F **POWER ELECTRONICS**

L T P	Class Work : 50
3 1 -	Exam : 100
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION : Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT & SIT.

SCR: Ratings and protections, series and parallel connections, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors; pulse transformer and opto-coupler, commutation techniques.

Section-B

AC REGULATORS: Types of regulator, equation of load current, calculation of extinction angle, output voltage equation, harmonics in load voltage and synchronous tap changer, three phase regulator.

CONVERTERS : One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand, effect of source inductance, introduction to four quadrant / dual converter, power factor improvement techniques,

forced commutated converter, MOSFET and transistor based converters.

Section-C

INVERTERS : Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray half bridge and full bridge inverters, McMurray -Bedford half bridge and bridge inverters, brief description of parallel and series inverters, current source inverter (CSI), transistor and MOSFET based inverters.

CHOPPERS : Basic scheme, output voltage control techniques, one, two, and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

Section-D

CYCLOCONVERTERS : Basic principle of frequency conversion, types of

cycloconverter, non-circulating and circulating types of cycloconverters.

DRIVES: Introduction to electric drives: DC drives – converter and chopper fed dc drives, ac drives – stator voltage control, V/f control, rotor resistance control, static Scherbius system and static Kramer systems.

Course Outcomes

CO1 - Articulate the basics of power electronic devices
CO2 - Express the design and control of rectifiers, inverters.
CO3 - Design of power electronic converters in power control applications
CO4 - Ability to express characteristics of SCR, BJT, MOSFET and IGBT.
CO5 - Ability design AC voltage controller and Cyclo Converter.

TEXT BOOK:

1. Power Electronics : MH Rashid; Pearson

REFERENCE BOOKS :

6 Power Electronics : PC Sen; TMH

7 Power Electronics : HC Rai; Galgotia

8 Thyristorised Power Controllers : GK Dubey, PHI

9 Power Electronics and Introduction to Drives : A.K.Gupta and L.P.Singh;Dhanpat Rai

10 Power Electronics: P.S Bhimra.

ECE-462-F GENETIC ALGORITHMS & APPLICATIONS

L T P	Theory : 100
3 1 -	Class Work : 50
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION: Overview, History of evolutionary computation: Search spaces & fitness landscapes, elements of genetic algorithms, comparison of Gas and tradition search methods.

Section-B

FUNDAMENTAL CONCEPTS OF GAS: Typical examples to illustrate how Gas work. Simple computer exercises.

Section-C

PROBLEM SOLVING USING GAS: Evolving computer programs, data analysis & prediction, evolving neural networks, simple computer exercises.

Section-D

IMPLEMENTATION OF GAS: Suitability of GA for typical problems, encoding a problem for a GA, adapting the encoding, selection methods, Genetic operators, Parameters for Gas.

Course Outcomes

CO1 - Understanding of evolutionary computation techniques and their broad applicability to a range of hard problems in search, optimisation and machine learning.
CO2 - To know when an evolutionary technique is applicable, which one to choose and how to evaluate the results.
CO3 - To know how to apply an evolutionary technique to a real problem and how to choose the parameters for optimal performance.
CO4 - Matching techniques with problems, evaluating results, tuning parameters, creating algorithms using inspiration from natural systems.

TEXT BOOKS:

1. Davis L,"Handbook of Genetic Algorithms

2**.** Goldberg D.E.,"Genetic Algorithms in Search optimization & Machine Learning.":

Pearson 3. Michalewiez, Z.,"Genetic Algorithms & Data Structures = Evolution Programs

ECE-454-F **RADAR AND SONAR ENGINEERING**

L T P
3 1 -

Class Work : 50
Exam : 100
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

INTRODUCTION TO RADAR: Radar Block Diagram & operation, Radar Frequencies, Radar development, Application of Radar.

Section-B

RADAR EQUATION: Simple form of Radar Equation, Prediction of Range performance, Minimum detectable signal, Receiver noise, Signal to Noise ratio, Transmitter Power, Pulse repetition frequency & range ambiguities, System losses, Propagation effects.

CW & FREQUENCY MODULATED RADAR: The Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple Frequency CW Radar.

Section-C

MTI & PULSE DOPPLER RADAR: Introduction, Delay Line Cancellors, Multiple or staggered, Pulse repetition frequencies, range-Gated Doppler Filters, Digital Signal Processing, Other MTI delay line, Limitation of MTI performance, Noncoherent MTI, Pulse Doppler Radar,

MTI from a moving platform.

TRACKING RADAR: Tracking with Radar, Sequential Lobbing, Conical Scan, Monopulse Tracking Radar, Tracking in range, Acquisition.

Section-D

RECEIVERS, DISPLAYS & DUPLEXERS : Radar Receivers, Noise Figure, Mixer, Low-noise Front ends, Displays, Duplexer, Receiver protectors.

INTRODUCTION TO SONAR

Course Outcomes:-

CO1 - Gained the fundamental knowledge about applications of Radar for both civil and military use.
CO2 - Gained the fundamental knowledge about applications of Sonar.
CO3 – gain the knowledge about receivers, displays & duplexers.

TEXT BOOK:

1. Introduction to Radar Systems: Merrill I. Skolnik, ; MGH

REFERENCE BOOK:

1. Electronic Communication Systems : Kennedy; TMH

EE-406-F **ADVANCED CONTROL SYSTEMS**

L T P	Theory : 100
3 1 -	Class Work : 50
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

STATE VARIABLE TECHNIQUES: State variable representation of systems by various methods. Solution of state equations-state transition matrix. Transfer function from state variable model. Controllability & observability of state variable model.

Section-B

SECOND ORDER SYSTEMS & STATE PLANE: Phase portrait of linear second systems. Method of isoclines, phase portrait of second order system with non-linearities, limit cycle, singular points.

Section-C

DESCRIBING FUNCTION ANALYSIS: Definition, limitations, use of describing function for stability analysis , describing function of ideal relay, relay with hysteresis & dead zone, saturation/coulomb friction & backlash,

LINEAR APPROXIMATION OF NONLINEAR SYSTEMS: Taylor series, Liapunov's 2_{nd} method.

Section-D

SAMPLED DATA SYSTEMS: Sampling process, impulse modulation, mathematical analysis of sampling process, application of Laplace transform, Shannon's theorem, reconstruction of sampled signal zero order & first order hold, Z-transform, definition, evaluation of Z-transform, Inverse Z-transform, pulse transfer function, limitations of Z-transform, state variable formulation of discrete time systems. Solution of discrete time state equations, stability, definition, the Schur-Cohn stability criterion, Jury's test of stability of extension of Routh-Hurwitz criterion to discrete time systems.

Course Outcomes (CLO):

After the successful completion of the course the students will be able to:

CO1 - demonstrate non-linear system behavior by phase plane and describing function methods.

CO2 - perform the stability analysis nonlinear systems by Lyapunov method develop design skills in optimal control problems

CO3 - derive discrete-time mathematical models in both time domain (difference equations, state equations) and z domain (transfer function using z-transform).
CO4 - predict and analyze transient and steady-state responses and stability and sensitivity of both open-loop and closed-loop linear, time-invariant, discrete-time control systems.
CO5 - acquire knowledge of state space and state feedback in modern control systems, pole placement, design of state observers and output feedback controllers

TEXT BOOKS:

7 Digital Control & State Variable Methods : M.Gopal ; TMH.

8 Modern Control Systems, 11/e: Richard C. Dorf; Pearson

REFERENCE BOOKS :

8 Modern Control Theory : M.Gopal ; Wiley International.

9 Discrete Slotine & W.P.Li; Prentice Hall, USA,

10 Digital Control Systems : B.C.Kuo

11 Applied non-linear control : J.E.

12 Nonlinear Control Systems: Isidari ; Springer-Verlag.

ECE-412-F **WIRELESS SENSOR NETWORKS**

L T P	Class Work : 50
3 1 -	Exam : 100
	Total : 150
	Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sectionswhich will be compulsory and of short answer type. Two questions will be set from each of the foursections. The students have to attempt first common question, which is compulsory, and one questionfrom each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

OVERVIEW OF WIRELESS SENSOR NETWORKS :

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

Section-B

ARCHITECTURES:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

Section-C

NETWORKING SENSORS :

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols-Energy-Efficient Routing, Geographic Routing.

Section-D

INFRASTRUCTURE ESTABLISHMENT :

Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

Course Outcomes

On completion of this course you should be able to:

CO1 - Apply knowledge of wireless sensor networks(WSN) to various application areas.

CO2 - Design and implement WSN and IoT.

CO3 - Conduct performance analysis of WSN.

CO4 - Formulate and solve problems creatively in the areas of WSN and IoT.

TEXT BOOKS:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.

2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.

2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

ECE-414-F **IMAGE PROCESSING**

L T P
3 1 -

Class Work : 50
Exam : 100
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Introduction: Fundamental steps in Digital Image Processing, Components of an Image Processing system, Digital Image Fundamentals: Elements of Visual Perception, Light and the electromagnetic spectrum, Image sensing and Acquisition, simple image formation model.

Image sampling and Quantization: concept of sampling & quantization, Representation of digital images, spatial and Graylevel resolution, Relationships between pixels-neighbors of pixel, Adjacency, connectivity, regions, and boundaries, distance measures, Image operations on a pixel basis.

Section-B

Image enhancement in Spatial domain: some basic Gray Level Transformations, Image negatives, log transformations, Power-Law transformations, piecewise –Linear Transformation functions; Histogram Processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering.

Section-C

Image Compression: Fundamentals, Image Compression Models: The source encoder and decoder, the channel encoder and decoder, elements of information theory: Measuring information, The information channel, Fundamental coding theorems; error free compression, lossy compression.

Section-D

Image Segmentation: Detection of Discontinuities: Point detection, Line Detection, Edge detection; Edge Linking and Boundary detection, Thresholding: Role of Illumination, basic global thresholding, basic adaptive thresholding, Regional based segmentation: Basic Formulation, Region growing, region splitting and merging; use of motion in segmentation: Spatial Techniques, Frequency Domain Techniques.

Course Outcomes (COs)

CO1: Review the fundamental concepts of a digital image processing system.
CO2 : Analyze images in the frequency domain using various transforms.
CO3 : Evaluate the techniques for image enhancement and image restoration.
CO4 : Categorize various compression techniques.

CO5: Interpret Image compression standards.

Text Books:

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Pearson
2. Anil K Jain, “Fundamentals of Digital Image Processing”, PHI Edition 1997.

Reference Books:

1. Keenneth R Castleman, " Digital Image Processing”, Pearson
2. Chanda & Majumder, “Digital Image Processing & Analysis”, PHI

IC-404-F **FUZZZY CONTROL SYSTEM**

L T P
3 1 -

Theory/Exam : 100
Class Work : 50
Total : 150
Duration of Exam : 3 Hrs.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section -A

INTRODUCTION: Fuzzy control from an industrial perspective, knowledge-based controllers, knowledge representation in KBC's.

THE MATHEMATICS OF FUZZY CONTROL:

Vagueness, fuzzy logic versus probability theory, fuzzy sets, their properties & operations on fuzzy sets, fuzzy relations & operations on fuzzy relations, the Extension Principle, Fuzzy propositions, The Compositional Rule of Inference, Different implications, Representing a set
of rules.

Section -B

FKBC DESIGN PARAMETERS: The PKBC architecture, choice of variables & content of rules, Derivation of rules, choice of membership functions, choice of scaling factors, choice of fuzzification procedure, choice of defuzzification procedure, comparison and evaluation of defuzzification methods.

Section -C

NONLINEAR FUZZY CONTROL: The Control Problem, The FKBC as a Non-Linear Transfer Element, Types of FKBC such as PID-like FKBC, Sliding Mode FKBC, Sugeno FKBC.

STABILITY OF FUZZY CONTROL SYSTEMS: The State space approach, Stability and robustness indices, input-output stability, circle criterion, the conicity criterion.

Section -D

ADAPTIVE FUZZY CONTROL: Design & Performance Evaluation, Approaches to Design such as membership function tuning using gradient descent, membership function tuning using performance criteria, the self-organizing controller, model based controller.

Course learning outcomes:

CO1 - Learn about formal methods to represent “vague” and “less” mathematical knowledge.
CO2 - Formalize and systematic approach to represent and control a large class of nonlinear dynamical systems.
CO3 - Combine some of the traditional design approaches with fuzzy-logic concepts. Design fuzzy-logic based controllers and explore their unique characteristics.
CO4 - Exposure with the new and exciting applications of “vague” knowledge processing and experience the impact on popular dynamical systems

TEXT BOOK:
An Introduction to Fuzzy Control: D.,Driankov, H.Hellendoorn and M.Reinfrank.; Narosa.

REFERENCE BOOKS:
Fuzzy Control Systems : Abraham Kandel and Gideon Imngholz; Narosa