M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B. TECH (Electronics & Computer Engineering)

SEMESTER 7th & 8th

'G' Scheme effective from 2021-22

COURSE CODE AND DEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

General Notes:

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

2. Students will be permitted to opt for any elective course run by the department. However, the department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. To run the elective course a minimum of 1/3rd students of the class should opt for it.

B.Tech (Electronics & Computer Engineering)
Scheme of Studies/Examination
Semester 7th
w.e.f. 2021-2022

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assesment	Theory	Practical	Total	
1	Professional Core Course	PCC-ECE-401G	Fiber Optic Communication (Common with ECE)	3	3	0	6	3	25	75	-	100	3
2	Professional Core Course	PCC-ECE-402-G	Antenna and Wave (Common with ECE)	3	3	0	6	3	25	75	-	100	3
3	Professional Elective Course	Refer to Annexure-I	Professional Elective-IV (Common with ECE)	3	3	0	6	3	25	75	-	100	3
4	Professional Core Course	PCC-CSE-401G	Neural Networks (Common with CSE)	3	0	0	3	3	25	75		100	3
5	Open Elective Course	Refer to Annexure OEC-I	Open Elective –I (Common with CSE)	3	0	0	3	3	25	75		100	3
6	Professional Core Course	LC-CSE-421G	Neural Networks Lab (Common with CSE)	0	0	2	2	1	25	-	25	50	3
7	Project	PROJ-ECE-407-G	Project Stage-I (Common with ECE)			4	4	5	50	-	100	150	3
8	Training	PT-ECE-431G	Practical Training-II	0	0	0	1	-	Refer Note 1				
		TOTAL CREDIT						**21**	**200**	**375**	**125**	**700**	

NOTE:

1. Practical Training II: The evaluation of Practical Training-II will be based on seminar, viva-voce, report submitted by the students. According to performance, the students will be awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical Training.

2. Choose one subject from each Professional Elective –IV, Open Elective –I. List of elective subjects is attached as annexures.

Annexure I

Professional Elective-IV

S. No.	Course Code	Course Title
1	PEC-ECE-411-G	Data Communication Networking & Security
2	PEC-ECE-412-G	Error Correcting Codes

Annexure OEC-I

Open Elective-I

1. OEC-PHY-101G: Material Science
2. OEC-ECE-451-G: Electronic Principles
3. HSMC-08G: Fundamentals of Management
4. OEC-CE-451-G: Disaster Management
5. HSMC-10G: English for Professionals

B.Tech (Electronics & Computer Engineering)
Scheme of Studies/Examination
Semester 8th
w.e.f. 2021-2022

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assesment	Theory	Practical	Total	
1	Professional Core Course	PCC-ECE-403-G	Satellite Communication (Common with ECE)	3	3	0	6	3	25	75	-	100	3
2	Professional Core Course	PCC-ECE-404-G	Microwave theory and technique (Common with ECE)	3	3	0	6	3	25	75	-	100	3
3	Professional Core Course	LC-ECE-406-G	Wireless & Satellite Communication Lab (Common with ECE)	0	0	2	2	1.5	25	-	25	50	3
4	Professional Core Course	PCC-CSE-402G	Machine Learning (Common with CSE)	3	0	0	3	3	25	75		100	3
5	Professional Core Course	PCC-CSE-404G	Big Data Analytics (Common with CSE)	3	0	0	3	3	25	75		100	3
6	Professional Core Course	LC-CSE-410G	Big Data Analytics Lab (Common with CSE)	0	0	0	2	1	25		25	50	3
7	Project	PROJ-CSE-422G	Project-III (Common with CSE)	0	0	8	4	4	50		50	100	3
		TOTAL CREDIT						**18.5**	**200**	**300**	**100**	**600**	

FIBER OPTICAL COMMUNICATION

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives:

During the duration of the course, students will be made to learn to:

1. Understand the working principles of the Optical communication systems.
2. Understand the optical networks and characteristics of elements used for communication.
3. Understand modulation schemes and their utility for different networks.
4. Analyze planning/budgeting of optical communication systems.

Unit – I

Introduction: Elements of Optical communication system. Principle of working, Ray Theory and electromagnetic mode theory for optical propagation. Type of optical fibers, step index and graded index and their characteristics. Optical losses: Attenuation, Absorption, Scattering, dispersion, polarization and fiber bend losses. Fabrication techniques of fiber.

Unit – II

Optical Sources: Basic concepts of light source: LED and Lasers. Working principle, Shape geometry, efficiency, Fabry Perot laser, quantum well lasers, and MQM and Quantum dot lasers. Characteristics of both LED and Lasers. Optical Detectors: Working principle, PN, PIN diodes, APD. Efficiency and effect of noise.

Unit – III

Link Budget: Link design, path loss calculations, safely margin and budgeting. Optical termination and distribution system. Optical Amplifiers and Modulation: EDFA, SOA and Raman amplifiers. Intensity modulation, concept of WDM and DWDM systems and networks.

Unit – IV

System Effects: Nonlinear effects in fiber optic links. Concept of self phase modulation, four wave mixing, Kerr effect. Soliton based communication system

TEXT BOOK:

Optical Fiber Communications: John M Senior; Pearson.

REFERENCE BOOKS:

1. Optical Communication Systems: John Gowar; PHI.
2. Optical Fiber Communications: Gerd Keiser; TMH

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. To explain the theory of optical communication.
2. To explain the various elements used and development in the field.
3. Various losses accrued by the fiber cable and link budgeting.
4. Working of amplifiers and there utilities.

ANTENNAS AND PROPAGATION

Course code	**PCC-ECE-402-G**				
Category	**Professional Core Course**				
Course title	**Antennas and Propagation**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 7th**
	03	**03**	0	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives:

During the course, students will be made to learn to:

1. Understand the working principles of the Antenna.
2. Understand the types of Antenna and their propagation.
3. Understand limitations and application for different networks.

Unit – I

Fundamental Concepts- Physical concept of radiation, Radiation pattern, near and far-field regions, reciprocity, directivity, gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.
Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

Unit – II

Aperture and Reflector Antennas, Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and cassegrain antennas

Unit – III

Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.
Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Unit – IV

Antenna Arrays- Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays using Schelkunoff polynomial method, Woodward-Lawson method. Concept and benefits of smart antennas

Text/Reference Books:

1. J.D. Kraus, Antennas, McGraw Hill, 1988.
2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.
3. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
4. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill, 1984.
5. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
6. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill, 2005
7. R.E. Crompton, Adaptive Antennas, John Wiley

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the properties and various types of antennas.
2. Analyze the properties of different types of antennas and their design.
3. Operate antenna design software tools and come up with the design of the antenna of required specifications

NEURAL NETWORK

Course code	PCC-CSE-401G				
Category	Professional Core Course				
Course title	Neural Networks				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

1. To understand the different issues involved in the design and implementation of a Neural Networks.
2. To study the basic of neural network and its activation functions.
3. To understand and use of perceptron and its application in real world
4. To develop an understanding of essential NN concepts such as: learning, feed forward and feed backward
5. To design and build a simple NN model to solve a problem

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1

Overview of biological neurons: Structure of biological neuron, neurobiological analogy, Biological neuron equivalencies to artificial neuron model, Evolution of neural network.

Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Stochastic function, Ramp function, , Linear function, Identity function.

ANN Architecture: Feed forward network, Feed backward network, single and multilayer network, fully recurrent network,

UNIT 2

McCulloch and Pits Neural Network (MCP Model): Architecture, Solution of AND, OR function using MCP model, Hebb Model: Architecture, training and testing, Hebb network for AND function.

Perceptron Network: Architecture, training, Testing, single and multi-output model, Perceptron for AND function

Linear function, application of linear model, linear seperatablity, solution of OR function using liner seperatablity model.

UNIT 3

Learning: Supervised, Unsupervised, reinforcement learning, Gradient Decent algorithm, generalized delta learning rule, Habbian learning, Competitive learning, Back propogation Network: Architecture, training and testing,

UNIT 4

Associative memory: Auto associative and Hetro associative memory and their architecture, training (insertion) and testing (Retrieval) algorithm using Hebb rule and Outer Product rule. Storage capacity, Testing of associative memory for missing and mistaken data, Bidirectional memory

Course Outcomes:

1. For a given conceptual problem student will able to analyze the problem and able to visualize in NN
2. Students will be familiar with different NN models.
3. Students will be able to understand the concept of learning in NN.

Text Books:

1. Introduction to artificial Neural systems by Jacek M. Zurada, 1994, Jaico Publ. House.
2. Principles of Soft Computing by S.N. Deepa, S.N. Sivanandam., Weley publication

Reference Books:

1. “Neural Networks :A Comprehensive formulation”, Simon Haykin, 1998, AW
2. “Neural Networks”, Kosko, 1992, PHI.
3. “Neural Network Fundamentals” – N.K. Bose , P. Liang, 2002, T.M.H
4. Neural Network , T.N.Shankar, University Science Press
5. Neuro Fuzzy Systems, Lamba, V.K., University Science Press

NEURAL NETWORKS LAB

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-421G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Neural Networks Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester 7</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5"></td></tr>
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Objectives of the course

1. To understand the different issues involved in the design and implementation of a Neural Networks.
2. To implement the basic of neural network and its activation functions.
3. To develop an understanding of essential NN concepts such as: learning, feed forward and feed backward
4. To design and implement a simple NN model to solve a problem

Practical problems:

1. Introduction to Matlab in context with NN.
2. Plotting of Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Ramp function, Identity function using matlab
3. Implementation of some basic model like MCP with suitable example.
4. Implementation of Hebb model with suitable example.
5. How the weights and bias values affect the output of a neuron.
6. How the choice of activation function (or transfer function) affects the output of a neuron. Experiment with
7. Implementation of linearly separable concept for a problem.
8. To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox.

Outcomes of the course

1. For a given conceptual problem student will be able to analyze the problem and able to visualize using NN
2. Students will be familiar with different NN models and its implementation.
3. Students will be able to understand the concept of learning in NN and its implementation.

Course code	**PROJ-ECE-407-G**				
Category	**Project**				
Course title	**Project Stage-I**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 7th**
	0	**0**	4	**4**	
Class work	50 Marks				
Exam	100 Marks				
Total	150 Marks				
Duration of Exam	3 Hours				

The object of Project Stage I is to enable the student to take up investigative study in the broad field of Electronics & Communication Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work.

The assignment to normally include:
1. Survey and study of published literature on the assigned topic;
2. Working out a preliminary Approach to the Problem relating to the assigned topic;
3. Conducting preliminary Analysis/Modelling/Simulation/Experiment/Design/Feasibility;
4. Preparing a Written Report on the Study conducted for presentation to the Department;
5. Final Seminar, as oral Presentation before a departmental committee.

DATA COMMUNICATION NETWORKING & SECURITY

Course code	**PEC-ECE-411-G**				
Category	**Professional Elective Course**				
Course title	**Data Communication Networking & Security**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 7th**
	3	**03**	0	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives:

During the course, students will be made to learn to:

1. Understand the working principles of Data Communication.
2. Understand the Data link layer.
3. Understand the network security.

UNIT-I

Overview of Data Communication and Networking: Data communications, Uses of computer Networks, The Internet, Protocols and standards, Layered tasks, OSI model, TCP/IP model.

Data and Signals, Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission impairment, Data Rate Limits, Performance, Digital Transmission, Digital-to-Digital Conversion, Analog-to-Digital Conversion, Analog Transmission, Digital-to-analog Conversion, Analog-to-analog Conversion

UNIT II

Physical layer: Bandwidth utilization: Multiplexing, FDM, WDM, TDM, Transmission Media, Guided Media, Unguided Media: Wireless, Switching, Circuit-Switched Networks, Datagram Networks. Modulation of digital data, Telephone Network,

Data Link Layer: Data link layer design issues, Error Detection and Correction, Data Link Control and Protocols, Types of errors, Detection, Error correction, Flow and error control.

UNIT III

Network Layer: Internetworks, Addressing: IP Address Classes, Subnet, CIDR, Routing, ARP, IP, ICMP, IPV6, Unicast routing, Unicast routing protocol, Multicast routing, Multicast routing protocols.

Transport layer: Process to process delivery, Elements of transport protocols, User datagram protocol (UDP), Transmission control protocol (TCP), Data traffic, Congestion, Congestion control, Quality of service, Techniques to improve QOS, Integrated services, Differentiated services, QOS in switched networks.

UNIT IV

Application layer: DNS-Domain Name System, Electronic mail, File transfer, HTTP, World wide web (WWW), Digitizing audio and video, Audio and video compression, Voice over IP.

Network Security: Cryptography, Symmetric key Algorithms (DES, AES), Public key Algorithms-RSA, Digital Signatures, Firewall

Text Books/Reference Books:

1. Data Communication and Networking by Behrouz A. Forouzan (Fourth Edition), Tata McGraw Hill
2. Computer Networks by Andrew S. Tanenbaum (Fifth Edition), Pearson Education
3. Introduction to Data communications and Networking ,W.Tomasi, Pearson education
4. Stallings William, Data and Computer Communication, Pearson Education (2000) 7th ed.

Course Outcomes:

1. Describe the technical aspects of data communications on the Internet
2. Analyze error detection/correction and flow control of data in the data network
3. Configure the network component and assign IP address.

ERROR CORRECTING CODES

Course code	**PEC-ECE-412-G**				
Category	**Professional Elective Course**				
Course title	**Error Correcting Codes**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 7th**
	3	**3**	0	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives:

During the course, students will be made to learn to:

1. Understand the encoding and decoding concept of the various codes.
2. Understand that using coding techniques how we improve the efficiency of communication system.
3. Understand various properties of different codes and how implements on different application.

UNIT I

Concept of information and entropy, Shannon theorem, Relation among Different entropies, Mutual information and self-information, channel capacity of different channels ,Basic conception of coding , Advantage of coding ,Source encoding and channel coding.

UNIT II

Linear block codes: introduction to linear block code. Syndrome and error detection Minimum distance of block code, Error detecting and error correcting capabilities of a block code, Hamming codes. Application of block codes for error control in data storage system.

UNIT III

Cyclic Codes: Description, Generator and parity check matrices, encoding, Syndrome computation and error detection, decoding, cyclic hamming codes, Shortened cyclic codes, error trapping decoding for cyclic codes. BCH codes, Decoding of BCH codes. Idempotent and Mattson-Solomon polynomials; Reed-Solomon codes, MDS codes,

UNIT IV

Convolution codes ; Encoding of convolutional codes, state diagrams, Trellis Diagram, structural and distance properties, Maximum likelihood decoding, sequential decoding algorithm,

Application of convolutional codes in ARQ system. Introduction to Space time codes, Diversity, orthogonal space –time block codes.

Text/Reference Books:

1. F.J. McWilliams and N.J.A. Slone, The theory of error correcting codes, 1977.
2. R.E. Balahut, Theory and practice of error control codes, Addison Wesley, 1983.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the error sources
2. Understand error control coding applied in digital communication

Material Science

Course code	OEC-PHY-101G				
Category	Open Elective Course				
Course title	Material Science				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of exam	03 Hours				

Course objectives:

The course intends to provide the knowledge of

1. Crystal structure and defects in solids.
2. Classification of different solids.
3. Properties of semiconductor, dielectric and magnetic materials.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - 1

Crystal Structure

Space lattice and translation vectors, Unit cell, Bravais lattice, Closed packed structures, Miller indices, Diffraction of electromagnetic waves by crystals: X-rays, electrons and neutrons, Bragg's law, X-ray diffraction (Laue and Powder method), Point defects in solids - Schottky and Frenkel defects.

UNIT - 2

Electrical Properties

Classification of solids into conductors, semiconductors and insulators, Semiconductor Materials: intrinsic and extrinsic, Fermi level and electron & hole concentrations at equilibrium, Carrier transport: diffusion and drift, p-n junction, Zener and Avalanche breakdown.

UNIT - 3

Magnetic Properties

Atomic magnetic moments and origin of magnetization, Types of magnetic materials, Ferromagnetism: molecular field, Curie temperature, Domain theory, Hysteresis and its applications.

Superconductivity: Properties of superconductors, Meissner effect, London equations, Elements of BCS Theory, Applications of superconductors.

UNIT - 4

Dielectric Properties

Molecular theory, Polarization, Electric displacement vector, susceptibility, dielectric constant, permittivity and various relations between these parameters, Gauss's law in the presence of a dielectric, Energy stored in a uniform electric field, Concept of local molecular fields and Claussius - Mossotti relation.

Course outcome:

At the end of the course, the student should at least be able to:

1. Segregate crystals based on their structure and apply effects of defects on manipulating properties of solids.
2. Distinguish between insulator, conductor and semiconductor. They should know the difference between intrinsic and extrinsic semiconductors and about the fermi level position in these semiconductors.
3. Select various dielectric, magnetic materials for specific applications in different fields.

Suggested reference books:

1. Concepts of Modern Physics- Arthur Beiser (TMGH)
2. Solid State Physics- S.O. Pillai (New Age Int. Ltd. Pub.)
3. Modern Physics for Engineers- S.P. Taneja (R. Chand)
4. Engineering Physics- Satya Prakash (Pragati Prakashan)
5. Engineering Physics- Malik & Singh (McGraw Hill)
6. Charles Kittel, Introduction to Solid State Physics, 7^{th} Edition, John Wiley & Sons, 2008.
7. S O Pillai, Solid State Physics, 8^{th} edition, New Age international Publishers, 2018

ELECTRONIC PRINCIPLES

Course code	OEC-ECE-451-G				
Category	Open Elective Course				
Course title	Electronic Principles				
Scheme and Credits	L	T	P	Credits	Semester 7th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Course Objective:

1. Study the basic principles of electronic systems.
2. Understand working of Digital electronics.
3. Understand the working of Display devices.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1

SEMICONDUCTOR DIODE: P-N junction and its V-I 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.

UNIT 2

ELECTRONIC DEVICES: LED, Zener Diode as voltage regulator, BJT, UJT, MOSFET, Thyristor, DIAC, TRIAC.

UNIT 3

DISPLAY DEVICES: LED, LCD, Seven Segment, Sixteen Segment.

UNIT 4

DIGITAL ELECTRONICS: Binary, Octal and Hexadecimal number system and conversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT) NAND, NOR as universal gates, Difference between combinational circuits and sequential circuits, Introduction to flipflops (S-R & J-K).

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the working of electronic components.
2. Understand the Digital System and various displays.

TEXT BOOK :

1.Integrated Electronics: Millman & Halkias ; McGrawHill

2.Modren Digital Electronics: R.P. Jain; McGraw-Hill

REFERENCE BOOKS:

1. Electronics Principles: Malvino ; McGrawHill
2. Electronics Circuits: Donald L. Schilling & Charles Belove ; McGrawHill
3. Electronics Devices & Circuits: Boylestad & Nashelsky ; Pearson.

FUNDAMENTALS OF MANAGEMENT

Course code	HSMC-08G				
Category	Open Elective Course				
Course title	Fundamentals of Management				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
Students will be able to understand:

1. Evolution of Management and contribution of Management thinkers.
2. The importance of staffing and training
3. The concept of material management and inventory control
4. The components of marketing and advertising, various sources of finance and capital structure.

UNIT 1

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.

UNIT 2

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.

UNIT 3
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.

UNIT 4

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:

Students will be able to understand

1. Evolution of Management and contribution of Management thinkers.
2. Importance of staffing and training
3. The concept of material management and inventory control
4. The components of marketing and advertising
5. Various sources of finance and capital structure

Suggested 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)

Suggested 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.

DISASTER MANAGEMENT

Course code	OEC-CE-451G				
Category	Open elective courses				
Course title	Disaster Management				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Course objectives:

1. To provide basic conceptual understanding of disasters and its relationships with development.
2. Provide an understanding of the social nature of natural hazards and disasters
3. Increase awareness of hazards and disasters around the world and the unequal social consequences stemming from disaster events.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-1

Introduction: Definition of Disaster, hazard, Global and Indian scenario, role of engineer, importance of study in human life, long term effects of disaster. Geological Mass Movement and land disasters, Atmospheric disasters, Disaster Mitigation

Unit-2

Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion

Man-made Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.

Unit -3

Case Studies: Damage profile analysis- Uttarkashi/Bhuj/Latur earthquakes, Kedarnath landslide, Kerala floods, cyclone Fani and Amphan, Bihar floods, Covid 19, Forest Related disasters, Mining disasters, Atmospheric disasters.

Unit 4

Disaster Management: Importance of public awareness, Preparation and execution of emergency management programme. Scope and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India. Use of Internet and software for effective disaster management. Applications of GIS, Remote sensing and GPS in this regard.

Course Outcomes:

After completing this course, students should be able:

1. To know natural as well as manmade disaster and their extent and possible effects on the economy.
2. To Plan national importance structures based upon the previous history.
3. To acquaint with government policies, acts and various organizational structures associated with an emergency.
4. To know the simple dos and don'ts in such extreme events and act accordingly.

Reference Books

1. Singhal J.P. Disaster Management, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, Disaster Science and Management, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

ENGLISH FOR PROFESSIONALS

Course code	HSMC-10G				
Category	Open Elective Course				
Course title	English For Professionals				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

The course aims at developing the desired language (English) skills of students of engineering and technology so that they become proficient in communication to excel in their professional lives. The course aims at developing competence for report writing with a focus on its complex writing techniques and procedures.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1

Communication Process Types and Levels, Scopes and significance, Technical and Tools of Effective communication

UNIT 2

Speaking files and Personality Development Oral Presentation, Body Language, Voice Modulation, Negotiation, Group Discussion, Interview techniques

UNIT 3

Advanced Technical Writing Job Application, CV writing, Business Letters, Memos, Minutes, Notices, Report Writing and structure, Blog writing.

UNIT 4

Communication and Media Recent Developments in Media, Context of Communication

SUGGESTED READING

1. Borowick, Jerome. N. *Technical Communication and its Applications*. New Delhi: PHI, 2000
2. Guffey, Mary Ellen. *Business Communication: Process & Product*. USA: South western College Publishing, 2000.
3. Kumar, Sanjay and Pushp Lata. *Communication Skills*. Delhi: OUP, 2011

SATELLITE COMMUNICATION

Course code	**PCC-ECE-403-G**				
Category	**Professional Core Course**				
Course title	**SATELLITE COMMUNICATION**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 8th**
	3	**03**	**0**	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objective:

1. Study the Satellite Communication Procedure.
2. Understand the analog and digital satellite communication.
3. Study the satellite link design.
4. Study the satellite orbits.

UNIT-I

PRINCIPLES OF SATELLITE COMMUNICATION: Evolution & growth of communication satellite, Synchronous satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite, Applications of satellite communication, Block diagram of transponder and Earth Station, Satellite communication with respect to Fiber Optic 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.

UNIT-II

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, Analog FM/FDM TV satellite link, 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, QAM, QPSK.

UNIT-III

MULTIPLE ACCESS TECHNIQUES: Introduction, TDMA, TDMA-Frame structure, TDMA-Burst structure, TDMA-Frame efficiency, TDMA- Superframe, TDMA Frame acquisition & Synchronization, TDMA compared to FDMA, TDMA Burst Time Plan. FDMA- FDM/FM/FDMA, Preassigned FDMA, Demand assigned FDMA, Spade System, Limitations of FDM/FM/FDMA, Comparison of TDMA and FDMA.

SATELLITE ORBITS: Introduction, Kepler's laws, Synchronous orbit, Orbital parameters, Satellite location with respect to earth, Look angles, Earth coverage & slant range, Eclipse effect, station keeping, Satellite stabilization, Geostationary and other orbits, Mechanism of launching a satellite.

UNIT-IV

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), LANDSAT, Defence satellite.

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

TEXT BOOK/ REFERENCE BOOK:

1. Satellite Communication: D.C. Aggarwal; Khanna.
2. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India. 2nd edition 2002
3. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill, 2009
4. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill,2009

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Visualize the architecture of satellite systems as a means of high speed, high range communication system.
2. State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
3. Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

MICROWAVE THEORY AND TECHNIQUES

Course code	**PCC-ECE-404-G**				
Category	**Professional Core Course**				
Course title	**Microwave Theory and Techniques**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 7th**
	03	**03**	0	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objective:

1. An understanding of microwave waveguides, passive & active devices, tubes and network analysis.
2. An ability to perform microwave measurements.

UNIT: I

WAVEGUIDES:

Introduction to Microwaves-History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical, EMI, EMC, 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.

UNIT: II

MICROWAVE COMPONENTS:

Directional couplers, tees, hybrid ring, S-parameters, attenuators, cavity resonators, mixers& detectors, matched Load, phase shifter, wave meter, and Ferrite devices, Isolators, circulators.

MICROWAVE TUBES:

Limitation of conventional tubes, Construction, operation and properties of Klystron amplifier, reflex Klystron, magnetron, TWT, BWO, crossed field amplifiers.

UNIT: III

MICROWAVE SOLID STATE DEVICES:

Varactor diode, Tunnel diode, Schottky diode, GUNN diode, IMPATT, TRAPATT and PIN diodes, MASER, parametric amplifiers.

MICROWAVE MEASUREMENTS:

Power measurement using calorimeter & bolometers, measurement of SWR, frequency wavelength and impedance, Microwave bridges.

UNIT: IV

MICROWAVE SYSTEMS:

Microwave Systems- Radar, Terrestrial and Satellite Communication, Radio Aids to Navigation, RFID, GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Medical and

Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Monolithic Microwave ICs, RF MEMS for microwave components, Microwave Imaging.

TEXT BOOKS:s

1. Samuel Liao, Microwave devices and circuits, PHI
2. M .Kulkarni, Microwave devices & Radar Engg, Umesh
3. R.E. Collins, Microwave Circuits, McGraw Hill
4. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house

REFERENCE BOOK:

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

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain different types of waveguides and their respective modes of propagation.
2. Analyze typical microwave networks using impedance, admittance, transmission and scattering matrix representations.
3. Explain working of microwave passive circuits such as isolator, circulator, Directional couplers, attenuators etc.
4. Describe and explain working of microwave tubes and solid state devices.

WIRELESS & SATELLITE COMMUNICATION LAB

Course code	**LC-ECE-406-G**				
Category	**Laboratory Course**				
Course title	**WIRELESS & SATELLITE COMMUNICATION LAB**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester 8th**
	0	**0**	**2**	**3**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	3 Hours				

LIST OF EXPERIMENTS:

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

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

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

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

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

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

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

8. To study Voice communication over DSSS.

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

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

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

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

NOTE:

At least ten experiments are to be performed.

BASICS OF MACHINE LEARNING

Course code	PCC-CSE-402G				
Category	Professional Core Course				
Course title	Basics of Machine Learning				
Scheme and Credits	L	T	P	Credits	Semester-8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To learn the basic concept of machine learning and types of machine learning.
2. To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
3. Explore supervised and unsupervised learning paradigms of machine learning.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-1

Introduction

Machine Learning: Definition, History, Need, Features, Block diagrammatic representation of learning machines, Classification of Machine Learning: Supervised learning, Unsupervised learning, Reinforcement Learning, Machine Learning life cycle, Applications of Machine Learning.

Unit-2

Dimensionality Reduction

Dimensionality reduction: Definition, Row vector and Column vector, how to represent a dataset, how to represent a dataset as a Matrix, Data preprocessing in Machine Learning: Feature Normalization, Mean of a data matrix, Column Standardization**,** Co-variance of a Data Matrix, Principal Component Analysis for Dimensionality reduction.

Unit-3

Supervised Learning

Supervised Learning: Definition, how it works. Types of Supervised learning algorithms k-Nearest Neighbours, Naïve Bayes, Decision Trees, Naive Bayes, Linear Regression, Logistic Regression, Support Vector Machines.

Unit-4

Unsupervised Learning

Unsupervised Learning: Clustering: K-means. Ensemble Methods: Boosting, Bagging, Random Forests.

Evaluation: Performance measurement of models in terms of accuracy, confusion matrix, precision & recall, F1-score, receiver Operating Characteristic Curve (ROC) curve and AUC, Median absolute deviation (MAD), Distribution of errors

Suggested books

1. E. Alpaydin, Introduction to
2. Machine Learning, Prentice Hall of India, 2006.

2. T Hastie, R Tibshirani and J Friedman, The Elements of Statistical Learning Data Mining, Inference, and Prediction, 2nd Edition, Springer, 2009.

3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2010.

Suggested reference books

1. R. O. Duda, P. E. Hart, and D.G. Stork, Pattern Classification, John Wiley and Sons, 2012.
2. Simon O. Haykin, Neural Networks and Learning Machines, Pearson Education, 2016

Course Outcomes

1. Understand fundamental issues and challenges of supervised and unsupervised learning techniques.
2. Extract features that can be used for a particular machine learning approach
3. To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
4. To mathematically analyse various machine learning approaches and paradigms.

BIG DATA ANALYTICS

Course code	PCC-CSE-404G				
Category	Professional Core Course				
Course title	Big Data Analytics				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To Provide an explanation of the architectural components and programming models used for scalable big data analysis.
2. To Identify the frequent data operations required for various types of data and Apply techniques to handle streaming data
3. To describe the connections between data management operations and the big data processing patterns needed to utilize them in large-scale analytical applications
4. To Identify describe and differentiate between relational and non-relational database and how Data Warehouses, Data Marts, Data Lakes, and Data Pipelines work.
5. Explain how the Extract, Transform, and Load process works to make raw data ready for analysis.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1

Introduction to Big Data: Big Data: Why and Where, Application and Challenges, Characteristics of Big Data and Dimensions of Scalability, The Six V, Data Science: Getting Value out of Big Data, Steps in the Data science process, Foundations for Big Data Systems and Programming, Distributed file systems

Unit: 2

Data Repositories and Big Data Platforms: RDBMS, NoSQL, Data Marts, Data Lakes, ETL, and Data Pipelines, Foundations of Big Data, Big Data Processing Tools, Modern Data Ecosystem, Key Players, Types of Data, Understanding Different Types of File Formats, Sources of Data Using Service Bindings

Unit: 3

Introduction to Big Data Modeling and Management: Data Storage, Data Quality, Data Operations, Data Ingestion, Scalability and Security Traditional DBMS and Big Data Management Systems, Real Life Applications, Data Model: Structure, Operations, Constraints, Types of Big Data Model

Unit: 4

Big Data Integration and processing: Big Data Processing, Retrieving: Data Query and retrieval, Information Integration, Big Data Processing pipelines, Analytical operations, Aggregation operation, High level Operation, Tools and Systems: Big Data workflow Management

Suggested books:

Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

Suggested reference books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
6. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
7. Pete Warden, "Big Data Glossary", O'Reily, 2011.
8. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
10. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

Course Outcomes

1. For a given query Describe the Big Data landscape including examples of real world big data problems including the three key sources of Big Data: people, organizations, and sensor.
2. For a given specification, Recognize different data elements in your own work and in everyday life problems
3. For a given specification select a data model to suit the characteristics of your data
4. For a given problem one will be able to Retrieve data from example database and big data management systems and identify when a big data problem needs data integration
5. For a given problem one will be able to design an approach to leverage data using the steps in the machine learning process and apply them to explore and prepare data for modelling.

BIG DATA ANALYTICS LAB

A student has to attempt 12-15 practicals based on theory on an open-source tool.

Project-III

Course code	PROJ-CSE-422G				
Category	Professional Core Course				
Course title	Project-III				
Scheme and Credits	L	T	P	Credits	Semester 8
	0	0	8	4	
Class work	50 Marks				
Exam	50 Marks				
Total	50 Marks				
Duration of Exam	03 Hrs				

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages:

(*Marks for internal evaluation are given in brackets)

1. Synopsis submission (10 marks),
2. 1st mid-term progress evaluation (10 marks)
3. 2nd mid-term progress evaluation (10 marks)
4. Final submission evaluation (20 marks).

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and viva.