List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Electronics and Communication Engineering*

Programme Name : *B.Tech.*

Academic Year : 2020-21

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	MA201TBS01	Mathematics-I
02.	PH201TBS02	Physics
03.	EC201TES01	Basic Electrical & Electronics Engineering
04.	IT201TES02	Introduction to Information Technologies
05.	EN201THS01	English Communication
06.	PH201PBS01	Physics Lab
07.	ME201PES01	Engineering Graphics
08.	ME201PES02	Workshop Technology & Practices
09.	EC201PES03	Basic Electrical Engineering Lab
10.	MA202TBS03	Mathematics-II
11	CY202TBS04	Chemistry
12	CE202TES03	Engineering Mechanics
13	CS202TES04	Computer Programming
14	CM202TES05	Basic Civil & Mechanical Engineering
15	CY202PBS02	Chemistry Lab
16	CE202PES04	Engineering Mechanics Lab
17	CS202PES05	Computer Programming Lab
18	EC03TPC01	Electronic Devices
19	EC03TPC02	Digital System Design
20	EC03TPC03	Signals and Systems
21	EC03TPC04	Network Theory
22	EC03TBS05	Mathematics-III
23	EC03THS02	Engineering Economics
24	EC03PPC01	Electronics Devices Lab
25	EC03PPC02	Digital System Design Lab
26	EC04TPC05	Analog and Digital Communication

27	EC04TPC06	Analog Circuits
28	EC04TPC07	Microcontrollers
29	EC04TBS06	Numerical Methods
30	EC04TES05	Electronics Measurement & Instrumentation
31	EC04THS03	Effective Technical Communication
32	EC04PPC03	Analog and Digital Communication Lab
33	EC04PPC04	Analog Circuits Lab
34	EC04PPC05	Microcontrollers Lab
35	EC05TPC08	Electromagnetic Waves
36	EC05TPC09	Computer Network
37	EC05TPC10	LIC and its Application
38	EC05TPC11	Control Systems
39	EC05TPE01	Information Theory & Coding
40	EC05TPE02	CMOS Design
41	EC05TPE03	Introduction to MEMS
42	EC05TPE04	Computer Architecture
43	EC05TOE01	Data Structure and Algorithms
44	EC05TOE02	Operating Systems
45	EC05PPC06	Electromagnetic Waves Lab
46	EC05PPC07	Computer Networks Lab
47	EC05PPC08	LIC and its Application Lab
48	EC06TPC12	Digital Signal Processing
49	EC06TPC13	Probability Theory and Stochastic Processes
50	EC06TPE05	Antenna & Wave Propagation
51	EC06TPE06	Power Electronics
52	EC06TPE07	High Speed Devices & Circuits
53	EC06TPE08	Nanoelectronics
54	EC06TOE03	Cryptography & network Security
55	EC06TOE04	Artificial Intelligence
56	EC06TBS07	Life Science
57	EC06PPC09	Digital Signal Processing Lab
58	EC06PPC10	Electronic Measurement Lab
59	EC06PPC11	Mini Project/Electronic Design Wokshop
60	EC5TPC07	Lic & Its Application
61	EC5TPC08	Communication System- II

62	EC5TPC09	Electromagnetic Field Theory
63	EC5TPE01	Microprocessor & Its Application
64	EC5TPE02	Data Structure & Operating System
65	EC5TOE11	Computer Architecture
66	EC5TOE12	OOP in C++
67	EC5TOE13	Introduction to Information Security
68	EC5TOE14	Project Management
69	EC5TOE15	Rural Technology and Community Development
70	EC5PPC07	Lic & Its Application Lab
71	EC5PPE01	Microprocessor & Its Application Lab
72	EC5PPC08	Communication System -II Lab
73	EC6TPC10	Digital Signal Processing
74	EC6TPC11	Antenna & wave propagation
75	EC6TPE03	Data Communication & Computer Networking
76	EC6TPE04	Fundamental of VLSI Design
77	EC6T0E21	UNIX, Operating System
78	EC6T0E22	Probability & Stochastic Process
79	EC6TOE23	Advanced Instrumentation
80	EC6T0E24	Knowledge management
81	EC6T0E25	Engineering System Design Optimization
82	EC6PPE02	VHDL Lab
83	EC6PPC06	Digital Signal Processing Lab
84	EC6PSP01	Seminar
85	EC7TPC12	Microwave Engineering
86	EC7TPC13	Wireless Mobile Communication
87	EC7TPE05	Advance Hardware Design
88	EC7TPE06	Power Electronics
89	EC7TOE31	Wireless Sensor Network
90	EC7TOE32	Information theory and coding
91	EC7TOE33	Nanotechnology
92	EC7TOE34	Optical instrumentation and measurement
93	EC7TOE35	Neural Network and Fuzzy Logic
94	EC7TPPC12	Microwave Engineering Lab
95	EC7TPPE05	Comprehensive Viva
96	EC7PSP02	Project-I

97	EC8TPC14	Radar and Satellite Engineering
98	EC8TPC15	Optical Fiber Communication
99	EC8TPE07	VLSI Fabrication Methodology
100	EC8TOE41	Basic building block of Microwave Engineering
101	EC8TOE42	Principle of Management
102	EC8TOE43	Mobile Computing
103	EC8TOE44	Embedded System
104	EC8TOE45	Advanced Power Electronics
105	EC8TPPC15	Optical Fiber Communication Lab
106	EC8TPPC16	Advanced RF and Microwave Design lab
107	EC8TPSP03	Project-II
108	EC8TPSP04	Comprehensive Viva
109	ET7100	Research Methodology in engineering
110	EC102	Vaccume Technology
111	EC103	Finite Element Method
112	EC104	Sensors Measurement Science & Technology
113	EC105	Artificial Intelligence
114	EC106	Optimization Techniques
115	EC107	Antenna for Modern Wireless Communication
116	EC108	Wireless and Computer Network

विभागाध्यक्ष (इले. एव संचार अभियांत्रिकी)
H.O.D. (Elect. & Comm. Engineering)
प्रौद्योगिकी संस्थान
Institute of Technology
गु. घा. वि., बिलासपुर (छ.ग.)
G. G. V. Bilaspur (C.G.)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06TPE06	3	1	0	4 hours	30	70	4

POWER ELECTRONICS

Course Objectives:

- To provide the students a deep insight in to the working of different switching devices with respect to their characteristics.
- To analyse different converters and control with their applications.
- To Learn to Analyse and design controlled rectifier, DC to DC converters, DC to AC inverters,
- To learn to Design SMPS.

Unit I: Characteristics of Semiconductor Power Devices: Thyristor, power MOSFET and IGBT- Treatment should consist of structure, Characteristics, operation, ratings, protections and thermal considerations. Brief introduction to power devices viz. TRIAC, MOS controlled thyristor (MCT), Power Integrated Circuit (PIC) (Smart Power), Triggering/Driver, commutation and snubber circuits for thyristor, power MOSFETs and IGBTs.

Unit II: Controlled Rectifiers: Single phase: Study of semi and full bridge converters for R, RL, RLE and Level loads. Analysis of load voltage and input current- Derivations of load form factor and ripple factor, Effect of source impedance, Input current Fourier series analysis of input current to derive input supply power factor, displacement factor and harmonic factor.

Unit III: Choppers: Quadrant operations of Type A, Type B, Type C, Type D and type E choppers, Control Techniques for choppers – TRC and CLC, Detailed analysis of Type A chopper. Step up chopper. Multiphase Chopper

Unit IV: Single-phase inverters: Principle of operation of full bridge square wave, quasi-square wave, PWM inverters and comparison of their performance. Driver circuits for above inverters and mathematical analysis of output (Fourier series) voltage and harmonic control at output of inverter (Fourier analysis of output voltage). Filters at the output of inverters.

Unit V: Switching Power Supplies: Analysis of fly back, forward converters for SMPS, **Applications:** Power line disturbances, EMI/EMC, power conditioners. Block diagram and configuration of UPS, salient features of UPS, selection of battery and charger ratings, sizing of UPS. Separately excited DC motor drive. P M Stepper motor Drive.

Text /Reference Books:

1. Muhammad H. Rashid, "Power electronics" Prentice Hall of India.
2. Ned Mohan, Robbins, "Power electronics", edition III, John Wiley and sons.
3. P.C. Sen., "Modern Power Electronics", edition II, Chand& Co.
4. V.R. Moorthi, "Power Electronics", Oxford University Press.
5. Cyril W., Lander," Power Electronics", edition III, McGraw Hill.
6. G K Dubey, S R Doradla,:Thyristorised Power Controllers", New Age International Publishers. SCR manual from GE, USA

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06TPE07	3	1	0	4 hours	30	70	4

HIGH SPEED DEVICES & CIRCUITS

Course Objectives:

- To understand the Challenges and concepts of High Speed Electronics.
- To understand the Electronic Materials structure and working principles useful for high speed device.
- To understand the concept of MESFET and Hetero Junctions in High Speed Devices and Electronics.

Unit I: Introduction: Requirement of High speed devices, circuits in Electronics; Classification and Properties of Compound Semiconductors, Ternary Compound Semiconductors and their Applications.

Unit II: Crystal Structures of GaAs, Dopants and Impurities in GaAs and InP, Brief overview of GaAs technology for High speed transistors, Epitaxial techniques, Molecular Beam Epitaxy, Liquid Phase Epitaxy.

Unit III: Metal Semiconductor contacts for MESFET-details, Ohmic contacts on Semiconductors.

Unit IV: MESFET operation and I-V Characteristics, Shockley's Model, Velocity Saturation Effect, Drain Current Saturation, Self-aligned MESFET-SAINT.

Unit V: Hetero Junctions, High Electron Mobility Transistor(HEMT), Heterojunction Bipolar Transistor (HBT)

Text/Reference Books:

1. S K Ghandhi, VLSI Fabrication Principles, 2nd Edition, Wiley India Pvt Ltd
2. C Y Chang & F Kai, GaAs High Speed Devices: Physics, Technology and Circuit Applications, Wiley, NY, 1994
3. H Beneking, High Speed Semiconductor Devices: Circuit aspects and fundamental behavior, Chapman and Hall, London, 1994
4. S M Sze, High Speed Semiconductor Devices, Wiley, 1990
5. Michael Shur, GaAs Devices and Circuits, Springer

Course Outcomes:

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

- Understand modern day electronic materials structures, properties required and concepts.
- Understand the VLSI Techniques and their Modifications required for High speed electronics.
- Understand the concept of Hetero-junction transistors

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06TPE08	3	1	0	4 hours	30	70	4

NANO ELECTRONICS

Course Objectives:

- To learn and understand basic and advance concepts of nanoelectronics.
- To introduce the Nanoelectronics & nano devices,
- To identify quantum mechanics behind nanoelectronics.
- To describe the principle and the operation of nanoelectronic
- To introduce basic theory of Metal Semiconductor Contacts, construction and operation of BJT and MOSFET and basic theory, operation and structure and scaling of MOS transistors.

Unit I: INTRODUCTION TO NANO- ELECTRONICS: The "Top-Down" Approach, Lithography, The "Bottom- Up" Approach, Why Nano electronics? Nanotechnology Potential, MESO structures.

Unit II: QUANTUM MECHANICS OF ELECTRONS: General Postulates of Quantum Mechanics Operators: Eigen values and Eigen functions, Hermitian Operators, Operators for Quantum Mechanics, Measurement Probability, Time Independent Schrodinger equation: Boundary Conditions on the Wave function.

PARTICLE STATISTICS AND DENSITY OF STATES: Density of States, Density of States in Lower Dimensions, Density of States in a Semiconductor, Particle in a box Concepts, Degeneracy.

Unit III: ELECTRONS SUBJECT TO A PERIODIC POTENTIAL-BAND THEORY OF SOLIDS: Crystalline Materials, Electrons in a Periodic Potential, Kronig Penney Model of Band Structure: Effective Mass, Brillouin Zones. Band Theory of Solids, Doping in Semiconductors, Interacting Systems Model, The Effect of an Electric Field on Energy Bands, Band structures of Some Semiconductors, Electronic Band Transitions Interaction of Electromagnetic Energy and Materials, Carbon Nano tubes.

Unit IV: COULOMB BLOCKADE AND THE SINGLE-ELECTRON TRANSISTOR: Coulomb Blockade: Coulomb Blockade in a Nanocapacitor, Tunnel Junctions, Tunnel Junction Excited by a Current Source, Coulomb Blockade in a Quantum Dot Circuit, Resonant Tunneling Diode, The Single-Electron Transistor : Single-Electron Transistor Logic, Other SET and FET Structures : Carbon Nanotube Transistors (FETs and SETs), Semiconductor Nanowire FETs and SETs, Molecular SETs and Molecular Electronics, 2D semiconductors and electronic devices, Graphene, atomistic simulation.

Unit V: Shrink-down approaches of Transistors: Introduction, CMOS Scaling, The nanoscale MOSFET, FinFETs, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.).

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06TOE03	3	0	0	3 hours	30	70	3

CRYPTOGRAPHY AND NETWORK SECURITY

Course Objectives:

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks and system.

Unit I: Introduction to Cryptography and Block Ciphers: Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linear crypt analysis of DES - block cipher modes of operations - triple DES – AES.

Unit II: Confidentiality and Modular Arithmetic: Confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.

Unit III: Public key cryptography and Authentication requirements: Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.

Unit IV: Integrity checks and Authentication algorithms: MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME.

Unit V: IP Security & Key Management and Web & System Security: IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management. Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06TOE04	3	0	0	3 hours	30	70	3

ARTIFICIAL INTELLIGENCE

Course Objectives:

- Students will develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
- Students to understand the main approaches to artificial intelligence such as heuristic search, game search, logical inference, decision theory, planning, machine learning, neural networks and natural language processing.

Unit I: Introduction of Artificial Intelligence(AI), Difference between Intelligence and Artificial Intelligence, Definitions of AI, Strong AI and Weak AI, Application areas of AI, Comparison of Conventional and AI Computing, History of AI, Turing Test, Branches of AI, Intelligent Agents, State Space Representation, Production System, Heuristic Search, Search Methods (Uninformed Search and Informed Search), Breadth First Search, Depth First Search, Difference between Breadth First Search and Depth First Search, Hill Climbing, Best First Search.

Unit II: Role of Knowledge Representation in AI, Types of Knowledge, Properties of Knowledge Representation System, Categories of Knowledge Representation Scheme, First Order Predicate Calculus, Well Formed Formula in Predicate Logic, Conversion to Clausal Form, Resolution in Predicate Logic, Semantic Nets, Properties of Semantic Nets, Frames, Scripts, Advantages and Disadvantages of Scripts.

Unit III: Introduction of Expert System, Comparison between Human Expert and Expert System, Comparison between Expert System and Software System, Difference between Knowledgebase and Database, Basic Components of an Expert System, Characteristics of Expert System, Life Cycle Development of Expert System, Advantages of Expert System, Limitation of Expert System, Expert System Tools, Existing Expert Systems (DENDRAL and MYCIN).

Unit IV: Introduction to LISP : Syntax and Numeric Functions, Working with GNU CLISP, Basic Data Objects in GNU CLISP, Basic List Manipulation Functions in GNU CLISP (setq, car, cdr, cons, list, append, last, member, reverse), User Defined Functions in GNU CLISP, Predicates (atom, equal, evenp, numberp, oddp, zerop, >=, <=, listp, null) and Conditionals (cond and if) in GNU CLISP, Logical Functions (not, or, and) in GNU CLISP, Input / Output and Local Variables (read, print, princ, terpri, format, let, prog) in GNU CLISP, Recursion and Iteration(do) in GNU CLISP, Arrays in GNU CLISP.

Unit V: Introduction to PROLOG, Term, Ground Term, Function, Predicate, Features of PROLOG, Program Clause, Unit Clause, Logic Program, Goal Clause, Empty Clause, Simple Query, Conjunctive Query, Structure of PROLOG Program, Working with SWI-Prolog General Syntax of PROLOG, Execution of a Query in Logic Program (Ground Query and Non-Ground Query),

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06TBS07	3	0	0	3 hours	30	70	3

LIFE SCIENCE

Course Objectives:

- Introduce the molecular basis of life.
- Provide the basis for classification of living organisms.
- Describe the transfer of genetic information.
- Introduce the techniques used for modification of living organisms.
- Describe the applications of biomaterials

Unit I: **Plant Physiology** covering, Transpiration; Mineral nutrition, **Ecology** covering, Ecosystems- Components, types, flow of matter and energy in an ecosystem; Community ecology- Characteristics, frequency, life forms, and biological spectrum; Ecosystem structure- Biotic and a-biotic factors, food chain, food web, ecological pyramids.

Unit II: **Population Dynamics** covering, Population ecology- Population characteristics, ecotypes; Population genetics- Concept of gene pool and genetic diversity in populations, polymorphism and heterogeneity; **Environmental Management** covering, Principles: Perspectives, concerns and management strategies; Policies and legal aspects- Environment Protection Acts and modification, International Treaties; Environmental Impact Assessment- Case studies (International Airport, thermal power plant)

Unit III: Molecular Genetics covering, Structures of DNA and RNA; Concept of Gene, Gene regulation, e.g., Operon concept; **Biotechnology** covering, Basic concepts: Totipotency and Cell manipulation; Plant , Methods and uses in agriculture, medicine and health; Recombinant DNA Technology- Basic Techniques and applications.

Unit IV: Biostatistics covering, Introduction to Biostatistics:-Terms used, types of data; Measures of Central Tendencies- Mean, Median, Mode, Normal and Skewed distributions; Analysis of Data- Hypothesis testing and ANNOVA (single factor)

Unit V: Laboratory & Fieldwork Sessions covering, Comparison of stomatal index in different plants; Study of mineral crystals in plants; Determination of diversity indices in plant communities; To construct ecological pyramids of population sizes in an ecosystem; Determination of Importance Value Index of a species in a plant community; Seminar (with PPTs) on EIA of a Mega-Project (e.g., Airport, Thermal/Nuclear Power Plant/ Oil spill scenario); Preparation and extraction of genomic DNA and determination of yield by UV absorbance; Isolation of Plasmid DNA and its separation by Gel Electrophoresis; Data analysis using Bio-statistical tools.

Text/Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd.
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06PPC09	0	0	4	4 hours	30	20	2

DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

- To implement Linear and Circular Convolution.
- To implement FIR and IIR filters.

List of Experiments:

Introduction to MATLAB or equivalent software

1. Generation of digital signals and random sequences also determine their correlations.
2. To verify Linear and Circular convolutions.
3. To compute DFT of sequence and its Spectrum Analysis.
4. To implement 8-point FFT algorithm.
5. To design of FIR filters using rectangular window techniques.
6. To design of FIR filters using triangular window techniques.
7. To design of FIR filters using Kaiser Window.
8. To design of Butterworth IIR filter.
9. To design of Chebyshev IIR filter.
10. To generate the down sample (decimation) by an Integer factor,
11. To generate the up sample (interpolation) by an Integer factor

Course Outcomes:

Upon successful completion of the course, students will be able to

- Analyze Finite word length effect on DSP systems.
- Demonstrate the applications of FFT to DSP.
- Implement adaptive filters for various applications of DSP.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06PPC10	0	0	2	2 hours	30	20	1

ELECTRONIC MEASUREMENT LAB

Course Objectives:

- To introduce students to monitor, analyze and control any physical system.
- To understand students how different types of meters work and their construction
- To introduce students a knowledge to use modern tools necessary for electrical projects

List of Experiments:

1. Measurement of unknown self-inductance using maxwell inductance bridge.
2. Measurement of unknown self-inductance of high quality factor using Hay's Bridge
3. Measurement of an unknown self -inductance using Anderson Bridge
4. Measurement of an unknown capacitance using De-Sauty's Bridge.
5. Measurement of an unknown capacitance using Wein's Series Resistance Bridge.
6. Measurement of an unknown capacitance using Schering's Bridge
7. To determine the sensitivity of LVDT and hence to show linear range of operation of LVDT.
8. To study the input /output characteristics of LVDT.
9. To study the characteristics of the Thermocouple.
10. To study Galvanometer.

Course Outcomes:

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

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.
- Ability to use Digital voltmeters

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC06PPC11	0	0	4	4 hours	30	20	2

MINI PROJECT/ELECTRONIC DESIGN WORKSHOP

Course objectives:

- To provide students for knowledge of Electronics Components and soldering techniques and its package information for electronics circuit design.
- Knowledge for the assembling of electronics circuit with components on PCB (Printed Circuit Board) of circuit design.
- Design and development of Small electronic project based on hardware and software for electronics systems

Course Guidelines:

1. The mini-project is a team activity having 3-4 students in a team. This is electronic product design work with a focus on electronic circuit design.
2. The mini project may be a complete hardware or a combination of hardware and Software. The software part in mini project should be less than 50% of the total work.
3. Mini project should cater to a small system required in laboratory or real life.
4. It should encompass components, devices, analog or digital IC's, micro controller with which functional familiarity is introduced.
5. After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of Mini-project.
6. Student is expected to detail out specifications, methodology, resources required, critical Issues involved in design and implementation and submit the proposal within first week of the semester.
7. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
8. Art work and layout should be made using cad based pcb simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.
9. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.
10. Students should follow the standard practice for electronic circuits/product design, converting the circuit design into a complete electronic product, PCB design using suitable simulation software, front panel design and mechanical aspects of the product, and guidelines for documentation /report writing.

Course Outcomes:

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

- Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.

ELECTRONICS & COMMUNICATION ENGINEERING Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPC07	3	1		3 hours	40	60	4

Course Objective

1. To understand the concepts, working principles and key applications of linear integrated circuits.
2. To perform analysis of circuits based on linear integrated circuits
3. To design circuits and systems for particular applications using linear integrated circuits.

LIC & ITS APPLICATIONS

UNIT – I

Basic Building Blocks for ICs & OPAMP: Basic Differential Amplifiers & Analysis, Introduction to OPAMP, Ideal OPAMP Characteristics, OPAMP ICs:741Pin Diagram and Pin Function, Inverting Amplifier, Non-Inverting Amplifier, Definition of OPAMP Parameters, Frequency Response of OPAMP, Open Loop & Closed Loop Configuration of OPAMP and its Comparisons, Voltage Comparator, Zero Crossing Detector, Level Detector.

UNIT – II

Applications of OPAMP: Introduction, Adder, Substractor/Difference Amplifier, Voltage Follower, Integrator, Differentiator, Comparator IC such as LM339, Window detector, Current to Voltage and Voltage to Current Converter, Instrumentation Amplifier, Precision Half Wave Rectifier, Precision Full Wave Rectifier, Log & antilog amplifier, Schmitt Trigger, Bridge Amplifier, Peak Detectors/Peak follower, Sample-and- Hold Amplifiers, Square wave generator, Saw-tooth wave generator, Triangular wave generator, Astable multivibrator, Monostable multivibrator, Dead Zone circuit- with positive output, with negative output, Precision clipper circuit, Generalized Impedance Converter (GIC) and its application.

Frequency response of OPAMP: Open loop voltage gain as a function of frequency, Unity gain Bandwidth, Close loop frequency response, Slew Rate.

UNIT – III

Active filters & PLL - Introduction to Filters, Merits & Demerits of active filters of over Passive Filter, Classification of filters, Response characteristics of Filter, First Order and Second Order active high pass, Low pass, Band pass and band reject Butterworth filters.

Phase Lock Loop: Operating Principle of the PLL, Linear Model of Phase Lock Loop, Lock Range and Capture Range, Application of the PLL. Voltage Controlled Oscillator(VCO).

UNIT – IV

D/A and A/D converters & Analog Multiplier: D/A converter - Ladder, R-2R, A/D converters- Ramp, Continuous conversion, Flash ADC, Dual slope ADC, Successive Approximation, Voltage to Time converters. Timing and circuits comparisons, DAC/ADC specifications.

Analog Multiplier: Basic Analog Multiplication Techniques, Applications of Multiplier- Frequency doubling, Phase-angle difference detection, Voltage dividing action, Square root of a signal, Function realization by Multiplier, Amplitude Modulator, Standard Modulator Circuit, Demodulation of AM signal.

UNIT – V

ELECTRONICS & COMMUNICATION ENGINEERING Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPC08	3	1		3 hours	40	60	4

Course Objectives:

- To understand the key modules of digital communication systems with emphasis on digital modulation techniques.
- To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.

COMMUNICATION SYSTEM – II

UNIT – I

Pulse Modulation: Sampling theorem, Basic principles of PAM, PWM and PPM, TDM, comparison of TDM with FDM; Typical multiplexed systems.

Pulse Code Modulation: Pulse code modulation, generation and detection of PCM, quantization, companding, A-Law and μ-Law, differential PCM; Delta modulation, Adaptive delta modulation.

UNIT – II

Digital Modulation Techniques: Introduction – Pass band Transmission model- Generation, Detection of BPSK, DPSK, DEPSK, QPSK, M-Ary PSK, QASK, BFSK, MSK, Duo- Binary Encoding, QAM.

UNIT – III

Optimal reception of digital signal: Performance of Digital Modulation Systems, S/N ratio of PCM and DM, Comparison of PCM and DM. pulse shaping of baseband signal, Equalization principles, ISI, Optimum Filter, Matched Filter, Error Probability of Various digital modulation Technique.

UNIT – IV

Information Theory: The concept of Information, average information, Entropy; Marginal, Conditional and Joint Entropies, Information rate , Shannon's theorm, Channel capacity, Bandwidth S/N tradeoff, Discrete communication channels, Shannon's limit, mutual information and channel capacity, Continuous communication channels, Channel with finite memory, Discrete memory less channels.

UNIT – V

Coding: General principles of coding, necessary and sufficient condition for noiseless coding, Coding efficiency, Shannon-Fano and Huffman coding; Error control, Hamming codes, Linear block codes, Cyclic codes, Convolutional codes - Viterbi Algorithm, Trellis coded Modulation.

SUGGESTED BOOKS & REFERENCE:-

1. Principles of Communication Systems –Taub and Shilling, Tata Mc Graw Hill.
2. Communication Systems –Simon Haykins. Tata McGraw Hill
3. Principles of Digital Communication Systems, B.P. Lathi, PHI
4. Principles of Digital Communications, Das, Mullick and Chatterjee, Wiley Eastern Publications.
5.Digital and Analog Communication Systems: K.Sam Shanmugam, John Wiley
6. Microelectronic Circuits: Sedra and Smith 6th edition, Oxford University Press.

ELECTRONICS & COMMUNICATION ENGINEERING Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPC09	3	1		3 hours	40	60	4

Course objective

1. To acquire the knowledge of Electromagnetic field theory that allows the student to have a solid theoretical foundation to be able in the future to design emission, propagation and reception of electro- magnetic wave systems
2. To identify, formulate and solve fields and electromagnetic waves propagation problems in a multidisciplinary frame individually.
3. To provide the students with a solid foundation in engineering fundamentals required to solve problems and also to pursue higher studies

ELECTROMAGNETIC FIELD THEORY

UNIT-I

INTRODUCTION: Review of vector analysis, Scalar & vector products, Coordinate systems and Transformation amongst rectangular, cylindrical and spherical co-ordinate system, Line, Surface and Volume Integral, Gradient of a Scalar, Divergent and Curl of a vector, Divergence Theorem, Stoke´s Theorem, Laplacian of a Scalar.

UNIT-II

Electrostatics: Coulomb's law, electric field intensity from point charges, field due to continuous distribution of charges, Electric Flux density, Gauss's law, Electric displacement and displacement density, Electric Potential, Potential field of a point charge, Laplace and Poison's equation.

Magnetostatics: Biot-Savart´s law, Ampere's circuital law and its Application, Magnetic flux density, Magnetic Scalar and Vector potential, Magnetic Energy stored.

UNIT-III

Time Dependent Field: Ampere's work law in differential work form, continuity of currents, Conduction and displacement currents, Maxwell's equation and their interpretations, Boundary conditions.

Energy Flow And Poynting Vector: Pointing theorem, interpretation of ExH.Simple application, complex pointing vector.

UNIT-IV

Wave equations, Sinusoidal time varying fields, uniform plane wave in dielectric and conductor media, Skin effect and depth of penetration, Reflection and refraction of plane waves at boundaries for normal and oblique incidence surface impedence.

UNIT-V

Transmission Lines: Transmission line theory from the circuit concept, Properties, Constants, Transmission line equations, Infinite line, Reflections in Transmission lines, Voltage Current and Impedance relations- Open and short circuit lines, Experimental determination of line constants, Standing wave ratio, Impedance matching, Quarter and half wave lines, Single stub and double stub matching, Circle diagram, Smith chart.

SUGGESTED BOOKS & REFERENCE:-