List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Electronics and Communication Engineering*

Programme Name : *B.Tech.*

Academic Year : 2019-20

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	EC01TBS01	Mathematics-II
02.	EC01TBS02	Chemistry
03.	EC01TES01	Programming for Problem Solving
04.	EC01TES02	Engineering Mechanics
05.	EC01PBS01	Chemistry Lab
06.	EC01PES01	Programming for Problem Solving Lab
07.	EC01PES02	Workshop Manufacturing & Practices
08.	EC01PES03	Engineering Mechanics Lab
09.	EC01PMC01	Induction Training Programme
10.	EC02TBS03	Physics
11	EC02TES01	Basic Electrical Engineering
12	EC02TBS04	Mathematics-I
13	EC02THS01	English
14	EC02TMC01	Environment Sciences
15	EC02PBS02	Physics Lab
16	EC02PES04	Basic Electrical Engineering Lab
17	EC02PES05	Engineering Graphics & Design 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	EC03TMC02	Constitution of India
25	EC03PPC01	Electronics Devices Lab
26	EC03PPC02	Digital System Design Lab

27	EC04TPC05	Analog and Digital Communication
28	EC04TPC06	Analog Circuits
29	EC04TPC07	Microcontrollers
30	EC04TBS06	Numerical Methods
31	EC04TES05	Electronics Measurement & Instrumentation
32	EC04THS03	Effective Technical Communication
33	EC04PPC03	Analog and Digital Communication Lab
34	EC04PPC04	Analog Circuits Lab
35	EC04PPC05	Microcontrollers Lab
36	EC5TPC07	Lic & Its Application
37	EC5TPC08	Communication System- II
38	EC5TPC09	Electromagnetic Field Theory
39	EC5TPE01	Microprocessor & Its Application
40	EC5TPE02	Data Structure & Operating System
41	EC5TOE11	Computer Architecture
42	EC5TOE12	OOP in C++
43	EC5TOE13	Introduction to Information Security
44	EC5TOE14	Project Management
45	EC5TOE15	Rural Technology and Community Development
46	EC5PPC07	LIC & ITS APPLICATION Lab
47	EC5PPE01	Microprocessor & Its Application Lab
48	EC5PPC08	Communication System -II Lab
49	EC6TPC10	Digital Signal Processing
50	EC6TPC11	Antenna & wave prapogation
51	EC6TPE03	Data Communication & Computer Networking
52	EC6TPE04	Fundamental of VLSI Design
53	EC6T0E21	UNIX, Operating System
54	EC6T0E22	Probability & Stochastic Process
55	EC6TOE23	Advanced Instrumentation
56	EC6T0E24	Knowledge management
57	EC6T0E25	Engineering System Design Optimization
58	EC6PPE02	VHDL Lab
59	EC6PPC06	Digital Signal Processing Lab
60	EC6PSP01	Seminar
61	EC7TPC12	Microwave Engineering

62	EC7TPC13	Wireless Mobile Communication
63	EC7TPE05	Advance Hardware Design
64	EC7TPE06	Power Electronics
65	EC7TOE31	Wireless Sensor Network
66	EC7TOE32	Information theory and coding
67	EC7TOE33	Nanotechnology
68	EC7TOE34	Optical instrumentation and measurement
69	EC7TOE35	Neural Network and Fuzzy Logic
70	EC7TPPC12	Microwave Engineering Lab
71	EC7TPPE05	Comprehensive Viva
72	EC7PSP02	Project-I
73	EC8TPC14	Radar and Satellite Engineering
74	EC8TPC15	Optical Fiber Communication
75	EC8TPE07	VLSI Fabrication Methodology
76	EC8TOE41	Basic building block of Microwave Engineering
77	EC8TOE42	Principle of Management
78	EC8TOE43	Mobile Computing
79	EC8TOE44	Embedded System
80	EC8TOE45	Advanced Power Electronics
81	EC8TPPC15	Optical Fiber Communication Lab
82	EC8TPPC16	Advanced RF and Microwave Design lab
83	EC8TPSP03	Project-II
84	EC8TPSP04	Comprehensive Viva
85	ET7100	Research Methodology in engineering
86	EC102	Vaccume Technology
87	EC103	Finite Element Method
88	EC104	Sensors Measurement Science & Technology
89	EC105	Artificial Intelligence
90	EC106	Optimization Techniques
91	EC107	Antenna for Modern Wireless Communication
92	EC108	Wireless and Computer Network

विभागाध्यक्ष (इले. एवं 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.)

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	EC02TBS03	L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject:	PHYSICS	3	1	0	15	15	30			

Course Learning Objectives:

- To know the basic principles, effects and applications such as physical, optical parameters used for Engineering applications.
- To learn about various laws and applications of electromagnetic theory.
- To know the basic structure, working principles and applications of lasers and optical fibre communication.
- To know the basics of semiconductor physics, semiconductor materials and devices and its characterization for advance technological applications
- To familiarize the basis of quantum theory and to make students to solve the physical problems for advancement of the technology.

Course Content:

Unit-1: Optics: Interference and Diffraction
Introduction, Young's experiment theory of interference, Coherent and non-coherent sources, Fresnel's Bi-prism and Newton's ring experiment.
Diffraction of light, Fresnel and Fraunhofer's diffraction, diffraction due to plane diffraction grating.

Unit-2 Electromagnetic Theory
Coulomb's law electrostatics field and potential, electric flux, Gauss' law, Poisson's and Laplace's equation. Equation of continuity for charge conservation, Ampere's and Faraday's laws, Maxwell's Electromagnetic equations.

Unit-3 Laser and Fiber optics
Introduction, elementary idea of spontaneous and stimulated emission, active medium population inversion, Einstein's coefficients, Types of lasers and important applications of lasers.
Introduction to optical fibers, basic principles of optical fiber, critical angle numerical aperture, maximum acceptance angle, classification of optical fiber.

Unit-4 Semiconductor physics and Devices
Formation of energy in solids, Energy band gap of metals, insulators and semiconductors, classification of semiconductor: Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in conductors and semiconductors, working of P-N junction diodes and Bipolar junction transistor.

Unit-5 Introduction to Quantum Mechanics
Introduction to QuantumMechanics, photoelectric effect, Compton effect, wave-particle duality, uncertainty principle, wave function, De-Broglie waves, phase and Group velocity, Davisson and Germer experiment, Schrodinger wave equation, particle in a box (I-Dimentional)

Text Books and References

1. Applied physics-I and II By Navneet Gupta, Dhanpat Rai & Co.
2. Engg. Physics by S.K.Srivastava and R.A. Yadav, New Age Pub. New Delhi

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	EC02TES03	L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject:	BASIC ELECTRICAL ENGINEERING	3	1	0	15	15	30			

Course Learning Objectives:

- To impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
- To provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
- To Highlight the importance of transformers in transmission and distribution of electric power.

Course Content:

***Module*-1: DC Circuits (8 hours)**
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

***Module*- 2: AC Circuits (8 hours)**
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

***Module*- 3: Transformers (6 hours)**
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

***Module*- 4: Electrical Machines (8 hours)**
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

***Module* - 5: Power Converters (6 hours)**
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

***Module* – 6: Electrical Installations (6 hours)**
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text / Reference Books
(i)D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(ii)D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	EC02TBS04	L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject:	MATHEMATICS-I	3	1	0	15	15	30			

Course Content

Module 1:Calculus (6 lectures)
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Module 2: Calculus (6 lectures)
Rolle'sTheorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

Module 3: Sequences and series:(10 lectures)
Convergence of sequence and series, tests for convergence, power series, and Taylor's series. Series for exponential, trigonometric and logarithmic functions; Fourier series: Half range sine and cosine series, Parseval's theorem. Asymptotes: definition, properties and problems.

Module 4:* Multivariable Calculus *(Differentiation):(8 lectures)
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Module 5: Matrices (10 lectures)
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigen values and eigen vectors; diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	EC02THS01	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	ENGLISH	3	0	0	15	15	30			

Course Learning Objectives

- To build up word power, to brush up the knowledge of English grammar, to develop good writing and speaking skills in the students

Course Content:

1. Vocabulary Building
The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

2. Basic Writing Skills
Sentence Structures , Use of phrases and clauses in sentences , Importance of proper punctuation , Creating coherence , Organizing principles of paragraphs in documents , Techniques for writing precisely

3. **Identifying Common Errors in Writing**
3.1 Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

4. Nature and Style of sensible Writing
Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion.

5. **Writing Practices**
Comprehension, Précis Writing, Essay Writing.

6. **Oral Communication** (This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995.
(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii)On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv)Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcome: At the end of the course students will be able

- learnt a lot of new words. They also learnt the particularities and peculiarities of English grammar. As a result, they could speak and write English with the least possible error

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	EC02TMC01	L	T	P	CT-1	CT-II	TOTAL	--	--	00
Subject:	ENVIRONMENTAL SCIENCES	3	0	0	--	--	--			

Course Learning Objectives:

- To learn the importance of Ecosystems, Natural Resources and Energy resources
- To learn the importance of Biodiversity and Environmental pollution
- To understand the Environmental ethics

Course Content:

Introduction to environmental studies Multidisciplinary nature of environmental studies: scope and importance: Concept of sustainability and sustainable development. Ecosystems: structure and function of ecosystem: Energy flow in an ecosystem: food chains. Food webs and ecological succession a) Forces: ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, Streams lakes, rivers, Oceans, estuaries). Natural Resources Renewable and Non-renewable Resources: Land resources and land use change: Land degradation, soil erosion and desertification. Deforestations: Causes and impacts due to mining, dam building on environment, forests biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts. Conflicts over water (international & inter-state) Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies Biodiversity and Conservation: Levels of biological diversity: genetic species and ecosystem diversity. Bio geographic zones of India.

Biodiversity patterns and global biodiversity hot spots India as a mega-biodiversity nation. Endangered and endemic species of India. Threats to biodiversity: Habitat loss poaching of wildlife man wildlife conflicts, biological invasions: Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value. Environmental pollution: Environmental pollution types, causes, effects and controls: Air, Water, soil and noise pollution. Nuclear hazards and human health risks. Solid waste management: Control measures of urban and industrial waste. Pollution case studies. Environmental potencies & practices, Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environment laws Environment protection Act: air (prevention & Control of pollution) Act: water (prevention and control of pollution) Act: wildlife protection Act: Forest Conservation Act; International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD), Nature reserves. tribal populations and rights, human wildlife conflicts in Indian context. Hunan Communities and the Environment. Human population growth: Impacts on environment. Human health and welfare. Resettlement and rehabilitation of project affected persons: case studies. Disaster management: floods, earthquake, cyclones and landslides. Environmental movements Chipko, silent valley Bishnois of Rajasthan. Environmental ethics: role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e. g.CNG vehicles in Delhi). Field work: visit to an area to document environmental assets. River/ forest/flora/fauna, etc. Visit to a local polluted site-urban/rural/Industrial/Agricultural. Study of common plants birds and basic principles of identification Study of simple ecosystems-pond river-etc.

Suggested Readings:

DEPARTMENT OF ECE ENGINEERING B.TECH. FIRST YEAR SYLLABUS W.E.F 2018-19

SYLLABUS	(SEMESTER-II)	CREDITS: 1.5			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	EC02PBS02	L	T	P	IA	MSE	TOTAL	
Subject:	PHYSICS LAB	0	0	3	30	-	30	20

Course Learning Objectives:

- To learn and perform the various practical related to optical components characterization, semiconductor material and devices characterization and know their applications in advance areas such as communication, industries, defence, navigation etc.

Course Content:

LIST OF EXPERIMENTS:

1. To determine the wavelength of sodium light with help of Fresnel's Bi-prism.
2. To determine the refractive index and dispersive power of the material of prism with the help of spectrometer.
3. To determine the sodium light by Newton's ring method.
4. To determine the wavelength of sodium light by plane diffraction grating using spectrometer.
5. To demonstrate the diffraction pattern and determine the wavelength of different colours of mercury (white) light using plane diffraction grating and spectrometer.
6. To determine the wavelength and number of line per cm on a diffraction grating using semiconductor laser diode.
7. To determine the specific rotation of sugar solution with the help of polarimeter.
8. Determine the width of the single slit and diameter of circular aperture using Fraunhofer diffraction pattern produced by semiconductor laser diode.
9. To determine the energy band gap (E_g) of a semiconductor material using P-N junction diode.
10. To determine the e/m ratio by the Thomson's method.
11. To study the P-N junction diode characteristics, in forwarded and reverse bias conditions.
12. To study the Zener diode characteristics.
13. To study the characteristics and gain of Transistor in C-B and C-E mode.
14. Determine the Planck's constant.

Course Outcomes: On completion of the course, the students would be able to:

- Know about basic optical facts and phenomenon, characterization of optical components and devices
- To know the basic semiconductor materials and devices and their applications
- To know how the performance of semiconductor devices can be improves.

SYLLABUS	(SEMESTER-II)	CREDITS: 01			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	EC02PES04	L	T	P	IA	MSE	TOTAL	
Subject:	BASIC ELECTRICAL ENGINEERING LAB	0	0	2	30	0	30	20

Course Learning Objectives:

1. To understand basic electrical wiring, measurements, and method.
2. To get acquainted with different measuring instruments.
3. To practically provide the concept of different theorems.
4. To make students understand d measurement errors.
5. To have actually hands-on on machines like transformers to get better understanding.

Course Content:

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
  Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
- Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and
  Verification. Observation of phase differences between current and voltage. Resonancein R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidalwave-shapeduetoB-Hcurvenonlinearityshouldbeshownalongwitha discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).
- Phase-shifts between the primary and secondary side. Cumulative three-phase power
  in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load.
  Control of voltage through field excitation.
- Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the
  use of dc-ac converter for speed control of an induction motor and (d) Components of
  LT switchgear.

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

- Construct circuits and measure different electrical quantities.
- Analyze Single Phase and Three phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
- Acquire knowledge about different types of meters and take readings.
- Work on machines like transformers

SYLLABUS	(SEMESTER-II)	CREDITS: 2.5			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	EC02PES05	L	T	P	IA	MSE	TOTAL	
Subject:	ENGINEERING GRAPHICS & DESIGN LAB	1	0	3	30	0	30	20

Course Learning Objectives:

- To learn the basic of Engineering Drawing and Orthographic Projections
- To learn the Sections and Sectional Views of Right Angular Solids
- To learn the Isometric Projections covering and overview of Computer Graphics

Course Content:

UNIT-I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

UNIT-II

Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;
Projections of Regular Solids
Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale.

UNIT-III

Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT-IV

Isometric Projections covering

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT-V

Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

Suggested Text/Reference Books:

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC03TPC01	3	0	0	3 hours	30	70	3

ELECTRONIC DEVICES

Course Objectives:

Students will try to learn:

1. To understand operation of semiconductor devices.
2. To understand DC analysis and AC models of semiconductor devices.
3. To apply concepts for the design of Regulators and Amplifiers
4. To verify the theoretical concepts through laboratory and simulation experiments.
5. To implement mini projects based on concept of electronics circuit concepts.

UNIT-I :Semiconductor concept: Metals, Insulators and Semiconductors, Electrical properties of Ge and Si, Conductivity Equation, Mobility and Conductivity, Electron and holes in intrinsic and extrinsic semiconductors, Donor and Acceptor Impurities,

Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon, Transport Phenomena of semiconductor, Generation and recombination of carriers, Charge density in Semiconductor, Hall Effect, Injected minority charge carriers, Potential variation within graded semiconductor.

Junction Diode Characteristics: Properties of P-N junction, Open circuited P-N junction, V-I characteristics, Temperature dependence of V-I characteristics, Diode resistance, Current component of PN diode: Space charge capacitance, Charge control description of a diode, Diffusion capacitance, Junction diode switching times, Breakdown mechanism.

UNIT-II :Diode Circuits: Load line concepts, Graphical analysis, Clipper circuit, Clamper, Comparator, Rectifier, Full wave circuits, Filter circuits: Inductor filter, Capacitor filter, LC filter, Multiple LC filter, CLC or π filter, Zener diode regulator circuit.

OTHER DIODES: Negative conductance in semiconductors- Tunnel diode, Photo diode - Photo voltaic effect, Solar cells, Schottky Diode, Varactor Diode, Avalanche diode, PIN diode, LED, LASER.

UNIT-III :Transistor Characteristics: Junction Transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Transistor circuit configuration (CB, CE, CC)- Analytical Expression for transistor characteristics and Operation, Early Effect, Ebers-Moll Model, β-re model, Transistor as a switch.

Transistor Biasing and Thermal Stabilization: The operating point, Bias stability, Stability factor-Stabilization against variation in I_{CO}, V_{BE} and β, Emitter bias, Collector – to – base bias, Voltage divider bias with emitter bias, Emitter bypass capacitor. Bias compensation.

UNIT-IV: Field Effect Transistor (FET): JFET Construction, Operation, V-I characteristics, Transfer characteristics, Drain characteristics. Metal Oxide Semiconductor Field Effect Transistor (MOSFET)-Construction, Operation and characteristics, Depletion MOSFET, Enhancement MOSFET,

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC03TPC02	3	0	0	3 hours	30	70	3

DIGITAL SYSTEM DESIGN

Course Objectives:

Students will try to learn:

1. To understand number representation and conversion between different representation in digital electronic circuits.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To understand characteristics of memory and their classification.
4. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.
5. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
6. To implement combinational and sequential circuits using VHDL.

UNIT-I : Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De-Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

UNIT-II:MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel Shifter and ALU.

UNIT-III : Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorothmic State Machine Charts, Designing Finite synchronous circuits like Pulse train generator, PseudoRandom Binary Sequence generator, Clock generation

UNIT-IV : Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable Logic Devices like FPGA, Logic implementation using Programmable devices.

UNIT-V :VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis & Simulation , VHDL constructs and codes for combinational and sequential circuits.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition2012.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC03TPC03	3	0	0	3 hours	30	70	3

SIGNALS & SYSTEMS

Course Objectives:

Students will try to learn:

1. To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.
2. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain

UNIT-I: Signals and systems as seen in everyday life, and in various branches of engineering and science. Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity additivity and homogeneity, shift-invariance, causality, stability, realizability.

UNIT-II: Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs. Characterization of causality and stability of linear shift-invariant systems. System representation through differential equations and difference equations.

UNIT-III : Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem: The idea of signal space and orthogonal bases.

UNIT-IV : The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems- eigen functions, region of convergence, z-domain analysis.

UNIT-V: State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and it seffects. Relation between continuous and discrete time systems.

Text/Reference books:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall,1983.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
3. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.
4. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.
5. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill InternationalEdition: c1999.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC03TPC04	3	0	0	3 hours	30	70	3

NETWORK THEORY

Course Objectives:

Students will try to learn:

1. To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
2. To introduce students with the fundamental concepts in graph theory.
3. To analyze circuits in time and frequency domain.
4. To explain concepts of driving point and transfer functions, poles and zeroes of network functions.
5. To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

UNIT-I: Node and Mesh Analysis, matrix approach of network containing voltage and current sources and reactances, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

UNIT-II: Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

UNIT-III: Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

UNIT-IV: Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations.

UNIT-V: Convolution theorem and Two four port network and interconnections, Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.

Text/Reference Books

1. Van, Valkenburg.; "Network analysis"; Prentice hall of India, 2000
2. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill NewDelhi, 1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

Course Outcomes:

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

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC03TBS05	3	1	0	4 hours	30	70	4

MATHEMATICS – III

Course Objectives:

Students will try to learn:

1. To expand the given periodic function defined in the given range in terms of sine and cosine multiple of terms as a Fourier series.
2. To extremise the functional using integration technique.
3. To form and solve the partial differential equation using different analytical techniques.

UNIT – I : Functions of Complex Variables-Differentiation: Limit, Derivative, Analytic function, Cauchy-Riemann Equations, Harmonic Functions, finding harmonic conjugate, Elementary analytic functions (exponential, trigonometric, logarithmic) and their properties, Conformal mapping, Mobius transformation and their properties.

UNIT – II : Functions of Complex Variables- Integration: Complex Integration, Cauchy´s integral theorem, and Integral formula, Liouville's theorem and Maximum- Modulus theorem (without proof),Taylor´s & Laurent´s series, Singular point, Poles & resides, Residue theorem & its application to contour integration.

UNIT – III : Laplace Transform: Definition, Linearity, Shifting & Scaling properties, Transform of Elementary functions, Transform of Derivatives & Integrals, Multiplication by t &division by t, Inverse Laplace transform, Convolution theorem, Transform of Periodic functions, Unit Step function & Dirac delta function, Initial value and Final value theorems, Application to solution of ordinary differential equations.

UNIT – IV : Fourier Transform: Definition of Fourier Integrals- Fourier Sine & Cosine integrals, Complex form of Fourier integral, Fourier Sine & Cosine transforms, Complex form of Fourier Transform, Linearity, Shifting & Scaling properties, Modulation theorem, Inverse Fourier transform, Fourier transform of derivatives.

UNIT – V : Differential Equations: First order ordinary differential equations-Exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Second order linear differential equations with constant coefficient.

SUGGESTED BOOKS & REFERENCE:-

1. H K Das, "Advance Engg. Mathematics", S-Chand Publication
2. B S Grewal, "Higher Engg. Mathematics", Khanna Publication
3. Erwin Kreyszig, "Advance Engg. Mathematics", J Willey & Sons
4. Louis A Pipes, "Applied Mathematics for Engineers & Physicists", TMH
5. S.L .Ross, Differential Equations, 3rd Ed., Wiley India,2009.