List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Electronics and Communication Engineering*

Programme Name : *B.Tech.*

Academic Year : 2018-19

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	EC3THS03	Engineering Economics
19	EC3TPC01	Signals and Systems
20	EC3TBS01	Engineering Mathematics-III
21	EC3TES01	Network Analysis And Synthesis
22	EC3TES02	Electronic Devices
23	EC3TPC02	Digital Logic Circuits
24	EC3PES02	Electronics Devices Lab
25	EC3PPC02	Digital Logic Circuits Lab
26	EC4TBS02	Numerical Analysis

27	EC4TPC03	Automatic Control Systems
28	EC4TPC04	Analog Circuits
29	EC4TPC05	Communication System-I
30	EC4TPC06	Electronics Measurements & Instrumentation
31	EC4PPC04	Analog Circuits Lab
32	EC4PPC05	Communication System-I Lab
33	EC4PPC06	Electronic Measurements & Instrumentation Lab
34	EC5TPC07	Lic & Its Application
35	EC5TPC08	Communication System- II
36	EC5TPC09	Electromagnetic Field Theory
37	EC5TPE01	Microprocessor & Its Application
38	EC5TPE02	Data Structure & Operating System
39	EC5TOE11	Computer Architecture
40	EC5TOE12	OOP in C++
41	EC5TOE13	Introduction to Information Security
42	EC5TOE14	Project Management
43	EC5TOE15	Rural Technology and Community Development
44	EC5PPC07	LIC & ITS APPLICATION Lab
45	EC5PPE01	Microprocessor & Its Application Lab
46	EC5PPC08	Communication System -II Lab
47	EC6TPC10	Digital Signal Processing
48	EC6TPC11	Antenna & wave prapogation
49	EC6TPE03	Data Communication & Computer Networking
50	EC6TPE04	Fundamental of VLSI Design
51	EC6T0E21	UNIX, Operating System
52	EC6T0E22	Probability & Stochastic Process
53	EC6TOE23	Advanced Instrumentation
54	EC6T0E24	Knowledge management
55	EC6T0E25	Engineering System Design Optimization
56	EC6PPE02	VHDL Lab
57	EC6PPC06	Digital Signal Processing Lab
58	EC6PSP01	Seminar
59	EC7TPC12	Microwave Engineering
60	EC7TPC13	Wireless Mobile Communication
61	EC7TPE05	Advance Hardware Design

62	EC7TPE06	Power Electronics
63	EC7TOE31	Wireless Sensor Network
64	EC7TOE32	Information theory and coding
65	EC7TOE33	Nanotechnology
66	EC7TOE34	Optical instrumentation and measurement
67	EC7TOE35	Neural Network and Fuzzy Logic
68	EC7TPPC12	Microwave Engineering Lab
69	EC7TPPE05	Comprehensive Viva
70	EC7PSP02	Project-I
71	EC8TPC14	Radar and Satellite Engineering
72	EC8TPC15	Optical Fiber Communication
73	EC8TPE07	VLSI Fabrication Methodology
74	EC8TOE41	Basic building block of Microwave Engineering
75	EC8TOE42	Principle of Management
76	EC8TOE43	Mobile Computing
77	EC8TOE44	Embedded System
78	EC8TOE45	Advanced Power Electronics
79	EC8TPPC15	Optical Fiber Communication Lab
80	EC8TPPC16	Advanced RF and Microwave Design lab
81	EC8TPSP03	Project-II
82	EC8TPSP04	Comprehensive Viva
83	IT7100	Research Methodology in engineering
84	ECE7102	Vaccume Technology
85	ECE7103	Finite Element Method
86	ECE7104	Sensors Measurement Science & Technology
87	ECE7105	Artificial Intelligence

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:	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
EC3THS03	3	0		3 hours	40	60	3

ENGINEERING ECONOMICS

Unit 1: Basic Concepts and Definitions, Methodology of Economics, Demand and Supply - elasticity,Theory of the Firm and Market Structure, Price and output determinations in different types of market

Unit 2: Public Sector Economics –Welfare economics, Central and commercial banks and their functions, Industrial policies, theory of localization, weber &surgent Florence theory, investment analysis-NPV, ROI, IRR, Payback period, SWOT analysis.

Unit 3: Monetary and Fiscal Policy:Tools, impact on the economy , Inflation, Business Cycle, Cash Flow-2,3,4 Model.

Unit 4: Business Forecasting – Elementary techniques. Cost and Revenue Analysis. Capital Budget. Break Even Analysis.

Unit5: Indian economy; Urbanization, Unemployment-Poverty, Regional Disparities, Unorganized Sectors- Roll of Plans, Reforms-Post Independent period.

SUGGESTED TEXT BOOKS:-

1. Mankiw Gregory N.(2002), Principles of Economics, Thompson Asia
2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill

REFERENCE BOOKS:-

1. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
2. PareekSaroj (2003), Textbook of Business Economics, Sunrise Publishers

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TPC01	3	1		3 hours	40	60	4

SIGNALS & SYSTEM

UNIT – I

Signals & Systems: Classification of Signals, Classification of systems, Properties of systems - Invertibility, Causality, Stability, Time Invariance, Linearity; Time domain Analysis of Discrete time and Continuous time System – Natural and Forced Response, Impulse Response and Convolution, Properties of Convolution, Step Response, Systems described by difference and differential equations, Eigen values and Eigen functions.

UNIT – II

Analysis of Continuous time Signals: Fourier analysis of Continuous time LTI system, Fourier series Representation of Periodic signals: CTFS, Representation of Aperiodic Signals: CTFT, CTFT of Periodic Signals, Properties of CTFT, System Analysis with Fourier Transform, Analysis of Discrete time Signals: Frequency Response of Discrete time LTI system, Representation of Periodic signals: DTFS, Representation of Aperiodic Signals: DTFT, DTFT of Periodic Signals, Properties of DTFT, Frequency response of discrete time LTI systems.

UNIT – III

Review of Laplace transforms, Z-Transform: Z-transforms of common sequences, Properties of Z-transforms, Region of Convergence, Inverse Z-transforms, Analysis of discrete time systems using Z-transforms, Relation between Z and Laplace Transform, Relation between Z-Transform and DTFT.

UNIT – IV

DFT & Fast Fourier Transform: Introduction to DFT, Properties of DFT, Circular Convolution, Introduction to FFT, Decimation in Time Algorithm, Decimation in Frequency Algorithm, Difference & similarities between DIT & DIF Algorithm, IDFT using FFT Algorithm.

UNIT – V

State space Analysis: Block diagram presentation of LTI Systems, System Realization of Continuous and Discrete time systems, State Space analysis of continuous time LTI systems, solutions of state equation for continuous time LTI systems, State Space analysis of discrete time LTI systems, solutions of state equation for discrete time LTI systems.

SUGGESTED TEXT BOOKS:-

1. *Signals and Systems, by Simon Haykin and Barry Van Veen. Wiley, 1999.*
2. *Signal & System, Samarjit Ghosh, TMH.*
3. *Signal & System, P Ramesh Babu, Scitech Publication*

REFERENCE BOOKS:-

1. *Signal & System, A V Oppenheim, PHI*
2. *Signal & System, F Hussain, Umesh Publication*
3. *Schaum's Outline of Signals and Systems – H Hsu, TMH.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TBS01	3	1		3 hours	40	60	4

ENGINEERING MATHEMATICS - III

UNIT – I

Functions of Complex Variables: Limit, Derivative, Analytic function, Cauchy-Riemann Equations, Harmonic Functions, Geometrical representation, Transformation, Bilinear Transformation, Application to Flow problems, Complex Integration, Cauchy's integral theorem, and Integral formula, Taylor's & Laurent's series, Singular point, Poles & resides, Residue theorem & its application to contour integration.

UNIT – II

Fourier Series: Periodic Functions, Definition of Fourier series, Euler's formulae, Dirichlet conditions, Change of interval, Even and Odd Functions, Half Range Fourier Sine & Cosine series, Parseval's identity, Practical Harmonic Analysis.

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

Theory of Probability: Mathematical and Statistical definition of Probability, Addition Law of Probability, Multiplication Law of Probability, Conditional Probability, Bayes Theorem, Binomial Distribution, Poisson Distribution, Normal Distribution.

SUGGESTED TEXT BOOKS:-

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*

REFERENCE BOOKS:-

1. *Louis A Pipes, "Applied Mathematics for Engineers & Physicists", TMH*
2. *R M Rao & A S Bopardikar, "Wavelet Transforms- Introduction to Theory and ApplicationsAdvance Engg. Mathematics"*
3. *Burrus Sidney, R A Gopinath, Guo Haitao, "Introduction to Wavelets and Wavelet Transforms", Printice Hall International.*
4. *Y T Chan, "Wavelet Basics", Kluwer Academic Publishers*
5. *Lokenath Debnath, "Wavelet Transforms and their applications"*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TES01	3	1		3 hours	40	60	4

NETWORK ANALYSIS AND SYNTHESIS

UNIT – I

Review of Circuit concept, Network Graph Theory: Introduction, Concept of Network Graph, Terminology Used in Network Graph, Properties of Tree in a Graph, Formation of Incidence Matrix, Properties of Incidence Matrix, Number of Tree in a Graph, Cut Set Matrix, Loop Matrix, Interrelation among various Matrices, Sinusoidal steady state analysis of R, C L circuits, Excitation and Resonance

UNIT – II

First order differential equations: General & Particular solutions, time constants, Integration factor, Initial factor, Initial conditions in Networks: Why Study Initial Conditions, Initial Conditions In Element, Geometrical Interpretation Of Derivatives, A Procedure for Evaluating Initial Conditions, initial State of a Network, Second order differential equations: Internal Excitation, Network excited by external energy sources, Responses as related to the s-plane location of roots, General solutions in terms of S, Q and Wn, Review of Laplace transformations

UNIT – III

Impedance Function: Complex frequency, Transform impedance and transform circuits; Impulse, Unit Step, Ramp and Gate function; Waveform synthesis, Network Theorem: Thevenin's & Norton's theorem, Superposition, Reciprocity, Maximum Power transfer and Millman's theorem, Telligen's theorem.

UNIT – IV

Poles and Zeros of Network function: Restrictions on poles & zeros, Locations for transfer function & driving point functions, Time domain behavior from pole and zero plot, Stability of active network, Two port parameters: Relation of two port variables, Short circuit admittance parameter, Open circuit Impedance parameter, Transmission parameters, h-parameter, T-parameter, Relation between parameter sets, parallel connection of two Port network.

UNIT – V

Network Synthesis: Concept, Hurwitz property positive realness properties of positive real functions, Synthesis of RL, RC and LC, Driving point Impedance functions using simple canonical Networks-Foster and Causer form.

SUGGESTED TEXT BOOKS:

1. *M E Valkenburg, "Network Analysis", PHI/Pearson Edu*
2. *Engineering circuit analysis-Hayt and Kimberley, TMH*
3. *A Chakrabarty, "Circuit Theory Analysis & Synthesis", Dhanpat Rai & Co.*

REFERENCES BOOKS

1. *Network Theory- D. Roy Chaudhury, Newage Asian*
2. *Electric Circuit Analysis-Alexender and Sadiqu, TMH*
3. *Engineering circuit analysis-Hayt and Kimberley, TMH*
4. *A Sudhakar & Shyam Mohan S Palli, "Circuits and Networks:Analysis & Synthesis", TMH*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TES02	3	1		3 hours	40	60	4

ELECTRONIC DEVICES

UNIT – I

Review of Semiconductor concept, Transport Phenomena of semiconductor, Charge density in Semiconductor, Hall Effect, Injected minority charge carriers, Potential variation within graded semiconductor, Junction Diode Characteristics, Current component of PN diode, Diffusion capacitance, Junction diode switching times, Piecewise linear model, 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, Negative conductance in semiconductors- Tunnel diode, Photo diode - Photo voltaic effect, Solar cells, Shottky 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, 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, complementary MOSFET, Application of CMOS.

UNIT – V

Special semiconductor Devices:, Bi-CMOS device, MIS diode heterojunction devies, Silicon controlled rectifier: V-I characteristics, gate triggering characteristics, Application, Silicon-controlled switch. DIAC, TRIAC, Unijunction transistors - Construction, Operation, V-I characteristics, Triggering circuit, Control, Application.

SUGGESTED TEXT BOOKS:-

1. *Integrated Electronics: Analog & Digital Circuit Systems- Jacob Millman & Halkias, TMH*
2. *Electronic Devices & Circuits- Allen Mottershead, PHI*
3. *Electronic Devices & Circuit Theory- Boylestad & Nashelsky, PHI*

REFERENCE BOOKS:-

1. *Microelectronics – Millman and Grabel, TMH*
2. *Microelectronics circuits-Sedra/Smith, Oxford University Press*
3. *Electronic Devices & Circuit Analysis- K Lal Kishore, BS Publications*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TPC02	3	1	0	3 hours	40	60	4

DIGITAL LOGIC CIRCUITS

UNIT – I

CODES: Binary codes: Introduction & usefulness, Weighted & non-weighted codes, Sequential codes, Self complementing codes, Cyclic codes, 8-4-2-1 BCD code, Excess-3 code, Grey code: Binary to Grey and Grey to Binary code conversion, Error detecting code, Error correcting code, 7-bit Hamming code, ASCII code, EBCDIC code, Realization of Boolean Expressions: Reduction of Boolean Expressions using Laws, Theorems and Axioms of Boolean Algebra, Boolean expressions and logic diagram, Converting AND/OR/Invert logic to NAND/NOR logic, SOP and POS Forms and their Realization.

UNIT – II

Minimization Techniques: Expansion of a Boolean expression to SOP form, Expansion of a Boolean expression to POS form, 2,3 & 4 variable K-map: Mapping and minimization of SOP and POS expressions, Completely and Incompletely Specified function-Concept of Don't Care Terms.

UNIT – III

Combinational Circuits: Adder & Subtractor: Half adder, Full adder, Half subtractor, Full subtractor, Parallel binary adder, Look Ahead carry adder, Serial adder, BCD adder, Code converter, Parity bit generator/checker, Comparator, Decoder: 3-line to 8-line decoder, 8-4-2-1 BCD to Decimal decoder, BCD to 7 segment decoder, Encoder: Octal to Binary and Decimal to BCD encoder, Multiplexer: 2-input multiplexer, 4-input multiplexer, 16-input multiplexer, Demultiplexer: 1-line to 4-line & 1-line to 8-line demultiplexer, Multiplexer as Universal Logic Function Generator, Programmed Array Logic (PAL), PLA and PLD.

UNIT – IV

Sequential Circuits: Flip-Flop & Timing Circuits: S-R Latch, Gated S-R Latch, D Latch, J-K Flip-Flop, T Flip-Flop, Edge-triggered S-R, D, J-K, T Flip-Flops, Master-Slave Flip-Flop, Direct Preset and Clear Inputs, Shift Registers: PIPO, SIPO, PISO, SISO, Bi-directional Shift Registers, Universal Shift Registers, Counter: Asynchronous Counter: Ripple Counter, Design of Asynchronous Counter, Effect of propagation delay in Ripple Counter, Synchronous Counter: 4-bit Synchronous Up Counter, 4-bit Synchronous Down Counter, Design of Synchronous Counter, Ring Counter, Jhonson Counter, Pulse Train generators using Counter, Design of Sequence generator: Digital clock using counters.

UNIT – V

Digital Logic Families: Introduction, Simple Diode Gating and Transistor Inverter, Basic concepts of RTL and DTL, TTL, Open collector gates, TTL subfamilies, IIL, ECL, MOS Logic, CMOS Logic, Dynamic MOS Logic, Interfacing: TTL to CMOS, CMOS to TTL, Comparison among various logic families, Manufacturer's specification.

SUGGESTED TEXT BOOKS:

1. *A Anand Kumar, "Fundamentals of Digital Circuits", PHI*
2. *H Taub and D Schilling, "Digital Integrated Electronics", TMH*
3. *Digital Logic and Computer Design, Morris Mano, PHI*

REFERENCE BOOKS:

1. *An Engineering Approach to Digital Design, W. Fletcher, PHI Edition*
2. *Floyed & Jain, "Digital Fundamentals", Pearson Edu*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TBS02	3	1		3 hours	40	60	4

NUMERICAL ANALYSIS

UNIT – I

Approximations and Errors in Computations: Errors and their analysis, Types of Errors, General Error-formula, Errors in numerical computation, Curve Fitting: Methods of Least squares, Fitting of a straight line, Fitting of an exponential curves, Polynomial Fit, Non linear Regression (2nd degree parabola), Least squares Approximation, Method of moments.

UNIT – II

Numerical Solution of Algebraic and Transcendental Equations: Graphical Method, Bisection Method, Secant Method, Regulfalsi Method, Newton Raphson Method, Iteration Method AITKEN'S Method, Newton rate of convergence. Solution of a system of simultaneous linear algebraic Equations Direct method: Gauss elimination method, Gauss Jordon Method, Triangularization Method, Crout's Method, Choleshy Method, Ill conditioned system of equation and refinement of solution, Iterative Methods: Jacobi Iterative Method, Gauss Siedel Iterative Method, Successive Over Relaxation (SOR) Method.

UNIT – III

The Calculus of Finite Differences: Finite differences, Difference formula, Operators and relation between operators, Differences of a polynomial factorial polynomial, Effect of an error on a difference table, Inverse operator, Interpolation with equal intervals: Newton's forward and backward interpolation formula, Central difference interpolation formula: Gauss's forward and backward interpolation formula, Sterling's formula, Bessel's formula, Laplace-Everett's formula, Choice of interpolation formula, Interpolation with Unequal intervals: Lagrange's interpolation, Newton's difference formula, Hermit's interpolation, Inverse interpolation.

UNIT – IV

Numerical Differentiation and Intergration: Numerical Differentiation, Newton's forward and backward difference interpolation formula, Maxima and Minima of a Tabulated function, Numerical Integration: Newton-Cote's quadrative formula, Trapezoidal rule, Simpson's $1/3^{rd}$ rule, Boole's rule, Weddle rule, Difference Equations: Definition, Order and degree of a difference equation, Linear difference equation, Difference equations reducible to Linear form, Simultaneous difference equations with constant coefficients, Applications.

UNIT – V

Numerical solution of ordinary differential equation: Taylor series method, Picard's method, Euler's method, Modified Euler method, Runge's method, Runge Kutta method, Predict corrector method, Milne's method, Adam-Bashforth method, Numerical solution for partial differential equations: Classification of P.D.E. of the 2^{nd} order Elliptic equations, Solution of Laplace equation, Solution of Poisson's equation, Solution of elliptic equations by Relaxation method, Parabolic equations, Solution of one two dimensional heat equation, Hyperbolic equation, Solution of wave equations.

SUGGESTED TEXT BOOKS:-

1. *Jain & Iyngar, Numerical Methods for Scientific and Engineering Computations.*
2. *G S Rao, Numerical Analysis.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC03	3	1		3 hours	40	60	4

AUTOMATIC CONTROL SYSTEM

UNIT-I

Control System Component & Transfer Function: Control System Component & Transfer Function: System component, open loop and closed loop system, Introduction to feedback concept, Mathematical modeling of electrical & mechanical system. Transfer function of Linear system, Block diagram and its reduction procedure, Signal flow graph, Mason gain formula, System Components.

UNIT-II

Time Response Analysis: Time response of first and second order system, Types of systems, Steady State Error and Error Constants, Basic control action and automatic controllers, effects of proportional, integral, derivative and PID controller on system performance.

UNIT-III

Stability: Concept of stability, Necessary Condition for Stability, absolute and relative stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative stability Analysis, Root Locus Technique: Concept, Root locus techniques, Construction of Root Loci, Breakaway points, Determination of Roots from Root Locus, Root contours, Sensitivity of the Roots of the Characteristic Equation.

UNIT-IV

Frequency Domain analysis & Compensation Techniques: Correlation between time and frequency response, Polar Plots, Inverse Polar Plots, Bode Plots- details, Pole and Zero on real axis, Complex conjugate pole, Construction of Bode Plots, Compensation Network - phase lead, phase lag, lag-lead compensation, Feedback Compensation, Stability in Frequency Domain: Nyquist stability criteria, Nyquist contour, Mapping, Nyquist criteria, Assessment of relative stability using Nyquist criteria, Gain margin and Phase margin.

UNIT-V

State Variable Analysis and Design: Concept of State, State Variables and State Model for linear continuous time systems, State space representation using Phase variables, Phase variable formulations, State space representation using Canonical variables, State Variables and discrete time system, Diagonalization, Solution of State Equations, Controllability and Observability.

SUGGESTED TEXT BOOKS:-

1. *"Modern Control Engineering", Ogata, Pearson Education.*
2. *"Control System Engineering",M Gopal, New Age International.*
3. *"Automatic Control System"B.C. Kuo, PHI*
4. *"Linear Control System",B.S.Manke, Khanna Pub.*

REFERENCE BOOKS:-

1. *"Modern Control System",R.C.Dorf & R.N.Bishop, AWL Low price edition.*
2. *"Introduction to Control Engineering", Ajit K.Mandal, New Age International.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC04	3	1		3 hours	40	60	4

ANALOG CIRCUITS

UNIT – I

Low Frequency Transistor Amplifier: Graphical Analysis of CE amplifier; h-parameter Models for CB, CE, CC configurations and their Interrelationship; Analysis and Comparison of the three Configurations; Linear analysis of Transistor Circuits: Miller's Theorem: Cascading: Simplified Models and Calculation of CE and CC Amplifiers; Effect of emitter Resistance in CE amplifiers: Cascade amplifiers: Darlington Pair, analysis of Single stage FET amplifier-CS and CD Configuration.

UNIT – II

High Frequency Transistor Amplifier: CE hybrid pi model, Validity and parameter Variation, Current gain with Resistive load: frequency response of a single stage CE amplifier: Gain-Bandwidth product: CC stage High frequencies, Multistage Amplifier: Classification: Distortion in Amplifiers: Frequency Response: Bode Plots, Step response, Pass band of Cascaded Stages: Response of a two-stage RC coupled Amplifier at Low and High frequencies: sources of noise in transistor circuits, Noise figure.

UNIT – III

Feedback Amplifiers: Classification: Feedback concept, Ideal feedback amplifier, Properties of negative feedback amplifier topologies: Method of Analysis of feedback amplifier. Voltage series feedback: Voltage series feedback pair: Current series, current shunt, Voltage shunt feedback. Effect of feedback on amplifier bandwidth and stability.

UNIT – IV

Large Signal/ Power Amplifier: Classification, large signal amplifier characteristics, class A amplifiers: class A amplifier with direct-coupled resistive load , transformer-coupled class A amplifier, class A pushpull amplifiers, class B amplifiers- transformer-coupled push-pull class B amplifier, complementary symmetry push-pull class B amplifier, class AB amplifier, class C amplifier, Harmonic Distortion, Push-pull Amplifiers, Cross-over Distortion.

UNIT – V

Oscillator: Sinusoidal oscillator, Phase shift oscillator, Wien bridge oscillator, Resonant circuit oscillators: LC Collpit, LC Hartley, Amplitude, Frequency and Phase stability; Analysis of all oscillators, General form of oscillator configuration: Crystal oscillator, Tuned Amplifiers: Classification of tuned Amplifier, Analysis of single and double tuned amplifiers, Stagger tuned amplifier

SUGGESTED TEXT BOOKS:-

1. *Integrated Electronics, Millman & Halkias, TMH*
2. *Microelectronics, Millman & Grabel, TMH*

REFERENCE BOOKS:-

1. *Electronic Device & Circuits, David A Bell, PHI*
2. *Electronic Device & Circuit Theory, Boylestad & Nashelsky, PHI*