



**List of Courses Focus on Employability/ Entrepreneurship/
Skill Development**

Department : Electronics and Communication Engineering

Programme Name : B.Tech.

Academic Year : 2017-18

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	ENATHS01	Professional Communication English
02.	CHATBS01	Engineering Chemistry
03.	MEATES01	Engineering Mechanics
04.	CSATES02	Fundamental of Computers
05.	EMATBS02	Engineering Mathematics-I
06.	CHALBS01	Engineering Chemistry Lab
07.	MEALES01	Engineering Mechanics Lab
08.	MEALES03	Engineering Drawing
09.	CHBTHS02	Environmental Studies
10.	MEBTES04	Engineering Thermodynamics
11.	EEBTES05	Basic Electrical & Electronics Engineering
12.	PHBTBS03	Engineering Physics
13.	EMBTBS04	Engineering Mathematics-II
14.	EEBLES05	Basic Electrical & Electronics Engineering Lab
15.	PHBLBS03	Engineering Physics Lab
16.	MEBLES06	Workshop Practices
17.	EC3THS03	Engineering Economics
18.	EC3TPC01	Signals and Systems
19.	EC3TBS01	Engineering Mathematics-III
20.	EC3TES01	Network Analysis And Synthesis
21.	EC3TES02	Electronic Devices
22.	EC3TPC02	Digital Logic Circuits
23.	EC3PES02	Electronics Devices Lab
24.	EC3PPC02	Digital Logic Circuits Lab
25.	EC4TBS02	Numerical Analysis
26.	EC4TPC03	Automatic Control Systems



27	EC4TPC04	Analog Circuits
28	EC4TPC05	Communication System-I
29	EC4TPC06	Electronics Measurements & Instrumentation
30	EC4PPC04	Analog Circuits Lab
31	EC4PPC05	Communication System-I Lab
32	EC4PPC06	Electronic Measurements & Instrumentation Lab
33	EC5TPC07	Lic & Its Application
34	EC5TPC08	Communication System- II
35	EC5TPC09	Electromagnetic Field Theory
36	EC5TPE01	Microprocessor & Its Application
37	EC5TPE02	Data Structure & Operating System
38	EC5TOE11	Computer Architecture
39	EC5TOE12	OOP in C++
40	EC5TOE13	Introduction to Information Security
41	EC5TOE14	Project Management
42	EC5TOE15	Rural Technology and Community Development
43	EC5PPC07	LIC & ITS APPLICATION Lab
44	EC5PPE01	Microprocessor & Its Application Lab
45	EC5PPC08	Communication System -II Lab
46	EC6TPC10	Digital Signal Processing
47	EC6TPC11	Antenna & wave propagation
48	EC6TPE03	Data Communication & Computer Networking
49	EC6TPE04	Fundamental of VLSI Design
50	EC6T0E21	UNIX, Operating System
51	EC6T0E22	Probability & Stochastic Process
52	EC6T0E23	Advanced Instrumentation
53	EC6T0E24	Knowledge management
54	EC6T0E25	Engineering System Design Optimization
55	EC6PPE02	VHDL Lab
56	EC6PPC06	Digital Signal Processing Lab
57	EC6PSP01	Seminar
58	ECETH4101	Wireless and Mobile Communication
59	ECETH4102	VLSI Design & VHDL
60	ECETH4103	Power Electronics
61	ECETH4104	Microwave Engineering



62	ECETH4105	Embedded System
63	ECETH4106	Multirate Systems and Filter Banks
64	ECETH4107	Speech Signal Processing
65	ECETH4108	Wireless Sensor Network
66	ECETH4109	Artificial Intelligence & Expert Systems
67	ECETH4110	Neural Network & Fuzzy Logic System
68	ECETH4111	Biomedical Instrumentation
69	ECETH4112	Semiconductor Devices Modeling & Simulation
70	ECEPr4101	Project-I
71	ECEPr4102	Seminar
72	ECEPr4103	VLSI Design & VHDL Lab
73	ECEPr4104	Microwave Engineering Lab
74	ECETH4201	Radar & Satellite Communication
75	ECETH4202	Principle of Management
76	ECETH4203	Optical Fiber Communication
77	ECETH4204	Digital Image Processing
78	ECETH4205	Cryptography & Network Security
79	ECETH4206	Radar Engineering
80	ECETH4207	Mobile Computing
81	ECETH4208	Nano Technology
82	ECETH4209	Vacuum Technology
83	ECETH4210	Optimization Techniques
84	ECETH4211	Stochastic Process
85	ECEPr4201	Project-II
86	ECEPr4202	Comprehensive Viva-voce
87	ECEPr4203	Circuit Simulation Lab
88	ECEPr4204	Optical Fiber Communication Lab
89	IT7100	Research Methodology in engineering
90	ECE7102	Vacuum Technology
91	ECE7103	Finite Element Method
92	ECE7104	Sensors Measurement Science & Technology
93	ECE7105	Artificial Intelligence

व्यभागाध्यक्ष (इले. एवं संचार अभियंत्रिकी)
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							
Subject code	EEBTES05	Credit: 3			SESSIONAL - TA			ESE
Subject	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	L	T	P	CT	MSE	TA	Total
		3	1	0	10	20	10	40
								60

Unit 1 - DC Networks: Kirchoff's Laws, node voltage and mesh current methods, star-delta transformation, classification of Network Elements, Superposition theorem, Thevenin and Norton-theorems, maximum power transfer theorem, only independent sources, source conversion.

Unit 2 - Single Phase AC Circuits: RMS series and parallel circuits, representation notation, series and parallel resonance. Value, average value, form factor, solution of R,L,C of impedance, phasordiagram, power in complex

Three phase AC Circuits: Delta and star connections, line and phase quantities, solution of three phase circuits, balanced supply voltage and balanced load, phasordiagram, measurement of power in three phase circuits.

Unit 3 -Magnetic Circuits: B-H Curve, solution of magnetic circuits; Hysteresis and Eddy current losses. Difference between electric and magnetic circuits, behaviour of ferromagnetic material.

Single Phase Transformers Faradays' laws of electromagnetic induction, Transformer construction, emf equations, rating, phasor diagram on no load and full load, equivalent circuit, regulation, losses, efficiency, open and short circuit tests, autotransformer.

Unit 4 - D.C. Machines: Construction, DC Generator, emf equation; DC motor and its torque equations, classification and application, characteristics and speed control of DC motors,

Unit 5 - Semiconductor Devices: V-I characteristics of P-N Junction diode, diodeparameters, equivalent circuits, zener diode, working and characteristics, applications.

Rectifiers: Analysis of half wave & full wave rectifier with resistive load, efficiency, ripple factor, filter circuits.

Suggested Text Books and References:

1. Electrical Technology by B.L.Theraja, volume 1 and 2.
2. Electrical Technology by Ian Mckenzie-Smith and Edward Hughes.
3. Basic Electrical Engineering by I.J.Nagrath (TMH)
4. Fitzrald and Higgonbothom: Basic Electrical Engineering, 5th Edition, MGH.
5. Del Torro, Vincent: Electrical Engineering Fundamentals, 2nd Edition, PHI.
6. Cotton H: Advance Technology, ISSAC Pitman, London.
7. Electronic principles: A. V. Malvino
8. Electronic Devices: Bell
9. Electronic Devices & Circuits: Sanjeev Gupta
10. Electronic Devices & Circuits: Robert. L. Boylestad



Syllabus	SEMESTER-II								
Subject code	PHBTBS03	Credit: 3			SESSIONAL - TA				ESE
Subject	ENGINEERING PHYSICS	L	T	P	CT	MSE	TA	Total	ESE
		3	0	0	10	20	10	40	60

Unit - 1: Special Theory of Relativity

Reference frames, Concept of ether, Michelson- Morley experiment, Einstein's postulates, Lorentz Transformation, Length contraction, Time dilation, variation of mass with velocity, and Mass-Energy equivalence.

Unit - 2: Interference of Light

Introduction of Interference, Young's experiment, theory of Interference, Coherent and non-coherent sources, Fresnel's Bi-prism, Newton's ring.

Unit - 3: Diffraction of Light

Introduction of diffraction, Fresnel and Fraunhofer diffraction, resultant of n-harmonic waves, diffraction due to Plane diffraction grating.

Unit - 4: EM wave and Laser

Equation of continuity for charge conservation, Maxwell's Electromagnetic equations and their physical significance, Electromagnetic waves in free space.

Introduction, elementary idea of spontaneous and stimulated emission, active medium, population inversion, Einstein's coefficients, Applications of lasers.

Unit -5: Solid State Physics and Devices

Energy band gap of metals, insulators and semiconductors, Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in conductors and semiconductors, Construction, working and Applications of P-N Junction diodes and transistor.

Text Books and References

- 1) Engg. Physics by S. K. Srivastava and R. A. Yadav, New Age Pub. New Delhi
- 2) Engg. Physics by Uma Mukherjee, Narosa Publication
- 3) Engg. Physics by M. N. Avadhanulu, S. Chand Pub.
- 4) Engg. Physics by R. K. Gaur and S. L. Gupta, Dhanpat Rai Pub.
- 5) Electricity and Magnetism by Rangwala and Mahajan, Tata McGraw Hill, 1998
- 6) Concepts of Physics Part -II by H. C. Verma, Bharati Bhawan (P&D), 1998
- 7) Modern Physics by Beiser, McGraw Hill Inc. New York, Publication 1995
- 8) Modern Physics by Mani and Mehta, East-West Press Pvt. Ltd. 1998



Syllabus	SEMESTER-II								
Subject code	EMBTBS04	Credit: 3			SESSIONAL - TA				ESE
Subject	ENGINEERING MATHS-II	L	T	P	CT	MSE	TA	Total	
		3	0	0	10	20	10	40	60

UNIT-1: Linear Algebra: Vector space, Linear dependence and Linear Independence Linear transformation, Rank & Inverse by elementary transformation, System of Linear equations-inconsistency, Eigen value and Eigen vectors, Cayley-Hamilton theorem and its application to find inverse.

UNIT-2: Theory of Equations: Polynomial & Polynomial equation, Division Algorithm, roots of equations, Remainder theorem, Factor theorem, Synthetic division, Fundamental theorem of Algebra. Multiplication of roots, Reciprocal equations, Symmetric function of the roots, Descarte's Rule of sign, Cardon's Method, Ferrari's Method Descarte's Method.

UNIT-3: Vector Calculus: Vector functions, Differentiation of vectors, Velocity and acceleration, Scalar and vector field, Gradient of Scalar field, Directional derivative, properties of gradient, Divergence of vector, Point Function, curl of vector point function, properties of divergence and curl, Integration of vector function, Line integral, Surface Integral, Green, Gauss theorem and Stoke's theorem (without proof) and their simple applications.

UNIT-4: Complex Number : Complex number and its properties, conjugate complex number, Standard form of complex number, De Moivre's theorem, Roots of complex number, Exponential function of complex variable, Circular function of complex variable, Hyperbolic function of complex number, Logarithm of complex number $C + iS$ method of summation.

UNIT-5: Sequence, Convergent, Divergent, Oscillating sequence, Infinite series, Ratio test, Root test, Comparison test, Raabe's Logarithmic test, Couchy's Root test, Gauss's Test, Leibnitz Test Conditionally convergant.

Book Recommended:

1. Engineering Mathematics by H. K. Das
2. Engineering Mathematics by Bali & Iyengar
3. Higher Engineering Mathematics by B. S. Grewal



Syllabus	SEMESTER-II						ESE
Subject code	EEBLES05	Credit: 2			SESSIONAL - TA		ESE
Subject	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB	L	T	P	IA	Total	
		0	0	3	30	30	20

List of Laboratory Experiments:

1. To verify OHM's Law
2. To verify Kirchoff's Current Law
3. To verify Kirchoff's Voltage Law
4. To Verify Superposition Theorem
5. To Verify Maximum Power Transfer Theorem
6. To verify Thevenin's Theorem
7. To verify Nofton's Theorem
8. To find V-I Characteristics of incandescent lamp.
9. To find out R, L, C and power factor in series R-L-C Circuit.
10. To Measure Phase, Line quantities and Three Phase power in Star & delta connected Load
11. To perform OC & SC Test in single phase transformer.
12. To perform Load Test in Single Phase Transformer
13. To Perform Polarity Test in Single Phase Transformer
14. To Study Three Phase Squirrel Cage induction motor
15. Full & Half wave rectifiers

List of books for laboratory:

1. Laboratory courses in Electrical Engg: Tarnekar, Kharbanda, Bodkhe & Naik.
2. A text book of practicals in Electrical Engg: Dr. N.K.Jain



Syllabus	SEMESTER-II						
Subject code	PHBLBS03	Credit: 2			SESSIONAL - TA		ESE
Subject	ENGINEERING PHYSICS LAB	L	T	P	IA	Total	
		0	0	3	30	30	20

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 wavelength of sodium light by Newton's ring method.
4. To determine the wavelength of sodium light by plane diffraction grating.
5. To demonstrate the diffraction pattern and determine the wavelength of different colours of mercury light using diffraction grating.
6. To determine the wavelength and number of lines per cm on a diffraction grating using semiconductor laser diode.
7. Determine the width of the single slit and diameter of circular aperture using Fraunhofer diffraction pattern produced by semiconductor laser diode.
8. To determine the Energy band gap (Eg) of a semiconductor material using P-N junction diode.
9. To determine the e/m ratio by Thomson's method
10. To study the P-N junction diode characteristics, in forward and reverse bias conditions.
11. To study the Zener diode characteristics.
12. To study the characteristics and gain of Transistor in C-B and C-E mode.
13. To study the FET characteristics and determine different parameters.
14. To study the MOSFET characteristics

Text Books and References

1. Engg. Physics Practical by M. N. Avadhanulu, S. Chand Pub.
2. Unified Practical Physics by R. P. Goyal
3. Engg. Physics Practical by Ruby Das et al.
4. Engg. Physics Theory & Experiments by S. K. Srivastava, New Age International



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 & Sargent 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.

Unit 5: 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. Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers

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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 Y Oppenheim, PHI
2. Signal & System, F Hussain, Umesh Publication
3. Schaum's Outline of Signals and Systems - II Hsu, TMH.

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Rishabh
Ramesh



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 & residues, 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 Applications Advance Engg. Mathematics"
3. Burrus Sidney, R A Gopinath, Guo Haitao, "Introduction to Wavelets and Wavelet Transforms", Printice Hall International.
4. Y T Chan, "Wavelet Baslcs", Kluwer Academic Publishers
5. Lokenath Debnath, "Wavelet Transforms and their applications"

Abhishek

Arjun Th.



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, Tellegen'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 Vankenburg, "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-Alexander and Sadique, TMH
3. Engineering circuit analysis-Hayt and Kimberley, TMH
4. A Sudhakar & Shyam Mohan S Palli, "Circuits and Networks: Analysis & Synthesis", TMH

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 - A signature that appears to be "Anish" with a large flourish below it.
 - A signature that appears to be "Anish" written in a cursive style.



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 devices, 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 Mothershead, 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*

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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, Johnson 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. Floyd & Jahn, "Digital Fundamentals", Pearson Edu

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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, Regula-falsi Method, Newton Raphson Method, Iteration Method ALIKEN'S Method, Newton rate of convergence. Solution of a system of simultaneous linear algebraic Equations Direct method: Gauss elimination method, Gauss Jordan Method, Triangularization Method, Crout's Method, Cholesky Method, Ill conditioned system of equation and refinement of solution, Iterative Methods: Jacobi Iterative Method, Gauss Seidel 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 quadrature 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 2nd 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 & Lyngar, Numerical Methods for Scientific and Engineering Computations.
2. G S Rao, Numerical Analysis.

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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.

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A signature in the middle, possibly "Ajay".
A signature on the right, possibly "Ajay".



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*

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Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4-TPC05	3	1		3 hours	40	60	4

COMMUNICATION SYSTEM - I

UNIT - I

Random Variables & Processes: Probability, Random Variables, Cumulative Distribution Function, Probability density function, average value & Variance of Random Variable, co relation between random variables, Random process, auto correlation and Power spectral density of random process, classification of random process.

UNIT - II

Amplitude Modulation: Review of Signal Analysis, Introduction to communication system, Frequency Translation, A Method of Frequency Translation, Recovery of Baseband Signal, Amplitude Modulation, Maximum Allowable Modulation, The Square-Law Demodulation, Spectrum Of An AM Signal, Modulators & Balanced Modulators, Single Sideband Modulation, Method Of Generating A DSB signal, An SSB Signal, VSB, Multiplexing, Block Diagram of AM Transmitter & super heterodyne receiver.

UNIT - III

Exponential Modulation: Phase & Frequency Modulation: Mathematical representation of FM & PM signals, Relationship Between Phase & Frequency Modulation, Phase & Frequency Deviation, Spectrum Of An FM Signal, Transmission BW of FM waves, Phasor Diagram For FM waves, WBFM & NBFM, Generation of FM waves: Indirect FM (Armstrong Method), Direct FM, Demodulation of FM waves, Balanced frequency discriminator - Zero-crossing detector, comparison of AM and FM systems. Block Diagram of FM Transmitter & Receiver.

UNIT - IV

Mathematical Representation of Noise: Sources of noise, Frequency domain Representation of Noise, spectral component of noise, effect of filter on PSD of noise, superposition of noise, quadrature component of noise, resistor noise, available power, noise temperature, noise figure, two port cascaded systems, noise bandwidth, effective input noise temperature, White noise.

UNIT - V

Noise in CW Modulation: AM Receiver model, Signal to noise ratios for coherent reception, DSB-SC receiver, SSC-SC receiver, Noise in AM receivers using envelope detection, AM threshold effect, FM receiver model, Noise in FM reception, Capture effect in FM, Threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

SUGGESTED TEXT BOOKS:-

1. "Principles of Communication System", Tmb & Schilling, TMH
2. "Electronic Communication System", George Kennedy, TMH
3. "Principles of Communication Systems", Simon Haykin, John Wiley, 2nd Ed.

REFERENCE BOOKS:-

1. "Communication System", R P Singh & S D Sopre, TMH
2. "Modern Analog and Digital Communication", B.P Lathi 3rd edition, Oxford Press

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Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC06	3	0	0	3 hours	40	60	3

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

UNIT - I

Measurements, Significance of measurement, Methods of measurement, Instruments and measurement system, Classification of Instruments, Mode of Operation, Application of measurement system, Characteristics of instrument and measurement system; Elements of a Generalized Measurement System, Accuracy and precision, Significant figure, types of error, Probability of error.

UNIT - II

Electromechanical Indicating Instruments: Operating forces, Constructional Details, Types of Support, Torque/Weight Ratio, Control system, Damping- Air friction and Eddy current damping, D'Arsonval Galvanometer- construction, Torque Equation, Dynamic Behavior, Response of Galvanometer, Ballistic Galvanometer, PMMC- Construction, Torque Equation, Voltage/Current Measurement: Ammeter, Voltmeter, Ohmmeter, Multimeter (V.O.M.), Rationmeter, Megger, High frequency Measurement: Q-meter

UNIT - III

AC Bridge: Introduction, Sources and Detectors, General equation for bridge balance, General form of AC Bridge, Maxwell's Bridge, Hay's bridge, Anderson's bridge, De-Sauty's bridge, Schering bridge, Wien's bridge, Electronic Instruments: Introduction, Advantage of Electronic voltmeter, VTVM, Differential voltmeter, Electronic voltmeter using rectifier, True RMS reading voltmeter, Calorimeter power meter.

UNIT - IV

Transducers: Classification of transducer, Primary & Secondary, Passive & Active, Analog & Digital, Potentiometer, loading effect, Strain Gauge, Thermistor, Construction of thermistor, Thermocouple, LVDT, Advantage & Disadvantage of LVDT, RVDT, Capacitive Transducer, Piezo-electric transducer, Hall-effect Transducer, Capacitive Transducer, Pressure Transducer.

UNIT - V

Display devices: Digital display method, Segmental display- 7segment & 14 segment display, dot matrix, LED, LCD, TFT, Plasma display, DLP, Digital voltmeter (DVM): Types of DVM, Ramp type DVM, Integrating type DVM, Potentiometer type (non-integration type), Recorders: Analog Recorder, Null type Recorder, Single point Recorder, Graphical strip chart, X-Y recorders, Magnetic tape recorder, FM recorder, CRO: Introduction, Block diagram, CRT, Functional block diagram of sampling, Storage, Dual trace and dual beam oscilloscope.

SUGGESTED TEXT BOOKS:-

1. *Modern Electronic Instrumentation and Measurement Technique*, W D Cooper & A D Helfrick, PHI 2000
2. *A Course in Electrical and Electronic Measurements and Instrumentation*, A K Sawhney Dhanpat Rai & Sons, 2010

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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:741 Pin 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, Subtractor/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