

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

ELECTRONICS AND INSTRUMENTATION ENGINEERING

COURSE STRUCTURE (2011-2012)

II B.Tech. I Semester

Code	Subject	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
10BT3BS03	Special Functions and Complex Analysis	4	1	-	4	30	70	100
10BT30401	Semiconductor Devices and Circuits	4	1	-	4	30	70	100
10BT30223	Circuit Theory	4	1	-	4	30	70	100
10BT40404	Switching Theory and Logic Design	4	1	-	4	30	70	100
10BT31001	Thermodynamics and Fluid Mechanics	4	1	-	4	30	70	100
10BT30403	Signals and Systems	4	1	-	4	30	70	100
10BT30411	Semiconductor Devices and Circuits Lab	-	-	3	2	25	50	75
10BT30412	Simulation Lab	-	-	3	2	25	50	75
Total		24	6	6	28	230	520	750

II B.Tech. II Semester

Code	Subject	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
10BT41301	Control Systems	4	1	-	4	30	70	100
10BT41001	Electrical and Electronic Measurements	4	1	-	4	30	70	100
10BT41002	Transducers in Instrumentation	4	-	-	4	30	70	100
10BT40401	Electronic Circuit Analysis	4	-	-	4	30	70	100
10BT40221	Principles of Electrical Engineering	4	1	-	4	30	70	100
10BT40402	Pulse and Digital Circuits	4	-	-	4	30	70	100
10BT40231	Electrical Engineering Lab	-	-	3	2	25	50	75
10BT40411	Electronic Circuits Lab	-	-	3	2	25	50	75
10BT4HS02	Audit Course: Advanced English Communication Skills	-	3	-	-	-	-	-
Total		24	6	6	28	230	520	750

II B.Tech. I Semester

10BT3BS03: **SPECIAL FUNCTIONS AND COMPLEX ANALYSIS**

(Common to ECE, EEE, EIE & EConE)

L T P C

4 1 - 4

UNIT-I : Partial Differential Equations

Formation of Partial differential equations, Solutions of first order Partial Differential Equations using Lagrange's method. Method of separation of variables - solutions of one dimensional wave equation - Heat equation- Two dimensional Laplace equation under boundary conditions.

UNIT-II : Special Functions

Euler's Integrals - Beta and Gamma functions - properties - Relationship between beta and gamma functions- applications - evaluation of improper integrals using Beta and Gamma functions
Bessel function: Generating function-properties of Bessel functions - recurrence relations-Orthogonality.

UNIT-III : Limits and Continuity - Analytic Functions

Exponential, Trigonometric, logarithmic, Hyperbolic and general power (Z^c) - separation of real and imaginary parts - Limits and Continuity of functions. Differentiability - Analyticity - Cauchy Riemann equations- conjugate and harmonic conjugate functions - Milne Thompson method- potential functions.

UNIT-IV : Complex Integration

Line integral - evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem - Cauchy's integral formula - Derivatives of analytic function - generalized integral formula.- Evaluation of integrals using integral formula.

UNIT-V : Complex Power Series

Taylor theorem (with proof) - Laurent's theorem (without proof) - Taylor and Laurent's series expansions of complex functions - Singularities - types - residues - poles of order m.

UNIT-VI : Residue Calculus

Residue theorem - proof - applications - evaluation of integrals using residue theorem - evaluation of improper and real integrals of the type

$$\text{i) } \int_{-\infty}^{\infty} f(x)dx \quad \text{ii) } \int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta \quad \text{iii) } \int_{-\infty}^{\infty} e^{imx} f(x)dx$$

UNIT-VII : Rouche's Theorem - Applications

Argument principle - Rouché's theorem - determination of number of zeros of complex polynomials - maximum modulus principle - Fundamental theorem of Algebra - Cauchy's inequality - Liouville's theorem.

UNIT-VIII : Conformal Mapping

Definitions and examples, Mappings defined by $w = e^z$, $\ln z$, z^2 , $\sin z$, $\cos z$. Translation, Rotation, Inversion and Bilinear transformation - properties - fixed point - cross ratio - invariance of circles under bilinear transformation - determination of bilinear transformation using three given points.

TEXT BOOKS:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganatham and M.V.S.S.N. Prasad, *Mathematical Methods*, 5th Revised Edition, S. Chand & Company, 2010.
2. T.K.V. Iyenger, B. Krishna Gandhi..et al., *Text book of Engineering Mathematics*, Vol-III, 8th Edition, S. Chand & Company, 2011.

REFERENCE BOOKS:

1. Grewal, B.S., *Higher Engineering Mathematics*, 36th Edition, Khanna Publishers, Delhi.
2. Kreyszig, E., *Advanced Engineering Mathematics*, 8th Edition, John-Wiley.

II B.Tech. I Semester

10BT30401: SEMI CONDUCTOR DEVICES AND CIRCUITS
(Common to ECE, EEE, EIE & EConE)

L T P C
4 1 - 4

UNIT-I: PN Junction Diode

PN Junction Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical, Static and Dynamic Resistances, Diode Equivalent circuits, Junction capacitances, Break down Mechanisms in semiconductor Diodes, Zener Diode Characteristics.

UNIT-II: Rectifiers, Filters and Regulators

Halfwave rectifier and fullwave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, π - section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-III: Bipolar Junction Transistor

Transistor construction, BJT Operation, Transistor as an amplifier, Transistor currents and their relations, Input & Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications.

UNIT-IV: Transistor Biasing and Stabilization

Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization against Variations in V_{BE} and β , Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Problems on biasing circuits.

UNIT-V: Small Signal Analysis of BJT Amplifiers

BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Millers Theorem, Dual of Millers Theorem.

UNIT-VI: Field Effect Transistor

Construction, Principle of Operation and Characteristics of JFET and MOSFET (Enhancement & Depletion), Small Signal Model of JFET & MOSFET.

UNIT-VII: FET Amplifiers

Common Source, and Common Drain Amplifiers using FET, Generalized FET Amplifier, Biasing of FET, FET as Voltage Variable Resistor, Comparison between BJT and FET.

UNIT-VIII: Special Purpose Electronic Devices

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode.

TEXT BOOKS:

1. J. Millman, Christos C. Halkias, *Electronic Devices and Circuits*, 1991 Edition, TMH, 2008.
2. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, 9th Edition, PHI, 2006.
3. David A. Bell, *Electronic Devices and Circuits*, 5th Edition, Oxford University press, 2008.

REFERENCE BOOKS:

1. J. Millman and C.C. Halkias, *Integrated Electronics*, TMH, 2nd Edition, 1998.
2. K. Lal Kishore, *Electronic Devices and Circuits*, 2nd Edition, BSP, 2005.
3. Robert T. Paynter, *Introductory Electronic Devices and Circuits*, 7th Edition, PHI, 2005.
4. S. Salivahana, N. Suresh Kumar, A. Vallavaraj, *Electronic Devices and Circuits*, 2nd Edition, TMH, 2008.
5. Henry and Jeager, *Semiconductor Devices and Circuits*, Mc-Graw Hill.

II B.Tech. I Semester
10BT30223: CIRCUIT THEORY
(Common to ECE, EIE & EConE)

L T P C
4 1 - 4

UNIT-I : Fundamentals of Electrical Circuits

Concepts of charge, current, voltage and power, active & passive elements, reference concepts of direction for voltages & currents, voltage and current relationships for passive elements, Ohm's law, Kirchoff Laws, current division and voltage division rules, network reduction techniques, series, parallel, series-parallel circuits, star-delta and delta-star transformations, source transformation.

UNIT-II : Basic Nodal & Mesh Analysis

Basic definitions: node, path, loop, branch, nodal analysis and super node concept, mesh analysis and super mesh concept - problems.

UNIT-III : Fundamentals of AC Circuits

Introduction - advantages of AC supply, types of waveforms, importance of sinusoidal waveforms, basic definitions: waveform, cycle, time period, frequency, amplitude, determination of average and RMS value, form factor & peak factor for different alternating waveforms, phase and phase difference.

UNIT-IV : Single Phase AC Circuits

Sinusoidal response of R, L, C combination of R, L, C circuits, concept of impedance and power triangles, power factor, resonance, bandwidth and quality factor for series and parallel networks, locus diagram.

UNIT-V : Transient Analysis

Introduction - transient response of RL, RC and RLC for DC excitation, transient response of RL, RC and RLC for sinusoidal excitation, numerical problems.

UNIT-VI : Magnetically Coupled Circuits

Coupled circuits, self & mutual inductance, DOT conventions, coefficient of coupling, analysis of magnetic circuits: series, parallel and composite, comparison of electrical and magnetic circuits.

UNIT-VII : Network Theorems - I

Thevenin's, Norton's, Maximum power transfer and Superposition theorems for DC and sinusoidal excitations - applications.

UNIT-VIII : Network Theorems - II

Tellegen's, Millman's, Reciprocity, Substitution and Compensation theorems for DC and sinusoidal excitation - applications.

TEXT BOOKS:

1. A. Sudhakar & Shyam Mohan, *Electric Circuits*, Tata McGraw-Hill Company, 3rd Edition, 2007.
2. A. Chakrabarthy, *Circuits Theory*, Dhanpat Rai & Co, New Delhi, 2009.

REFERENCE BOOKS:

1. M.E. Van Valkenberg, *Network Analysis*, 3rd Edition, Pearson Publications, New Delhi, 2006.
2. William H. Hayt & Jack E. Kennedy & Steven M. Durbin, *Engineering Circuit Analysis*, 6th Edition, Tata McGraw-Hill Company, 2009.
3. J.A. Edminister & M.D. Nahvy, *Theory and Problems of Electric Circuits*, Schaums Outline Series, 4th Edition, Tata McGraw-Hill company, New Delhi, 2004.
4. G. K. Mittal, Ravi Mittal, *Network Analysis*, 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku, *Fundamentals of Electric Circuits*, 3rd Edition, Tata McGraw-Hill Publishing Company, New Delhi, 2010.

II B.Tech. I Semester

10BT40404: SWITCHING THEORY AND LOGIC DESIGN

(Common to EEE, EIE & EConE)

L T P C
4 1 - 4

UNIT-I: Number Systems & Codes

Philosophy of number systems – complement representation of negative numbers, binary arithmetic, binary codes, error detecting & error correcting codes, hamming codes.

UNIT-II: Boolean Algebra and Switching Functions

Fundamental postulates of Boolean Algebra, Basic theorems and properties, switching functions, Canonical and Standard forms, algebraic simplification, digital logic gates, properties of XOR gate, universal gates, Multilevel NAND/NOR realizations.

UNIT-III: Minimization of Switching Functions

Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart, simplification rules.

UNIT-IV: Combinational Logic Design

Design using conventional logic gates-Binary Adders, Subtractors, Look ahead carry generator, Decimal adder-BCD adder, Binary multiplier, Modular design using IC chips-Magnitude comparator, Encoder, Decoder, Multiplexer- MUX Realization of switching functions, De-Multiplexer, Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT-V: Programmable Logic Devices, Threshold Logic

Basic PLD's-ROM, PROM, PLA, PAL, Realization of Switching functions using PLD's. Capabilities and limitations of Threshold gate, synthesis of threshold functions, multigate synthesis.

UNIT-VI: Sequential Circuits - I

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic flip-flops, Triggering and excitation tables, Steps in synchronous sequential circuit design, Design of Synchronous counters – modulo-N, up/down counter, ring counter, Johnson counter, Design of Asynchronous counter-modulo-N, Sequence detector, Serial binary adder.

UNIT-VII: Sequential Circuits - II

Finite state machine-capabilities and limitations, Mealy and Moore models, minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods, concept of minimal cover table.

UNIT-VIII: Algorithmic State Machines

Salient features of the ASM chart, Simple examples, System design using data path and control subsystems, control implementations, examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

1. Morris Mano, *Digital Design*, 3rd Edition, PHI.
2. Zvi Kohavi, *Switching & Finite Automata theory*, 2nd Edition, TMH.

REFERENCE BOOKS:

1. Charles H. Roth, *Fundamentals of Logic Design*, 5th Edition, Thomson Publications, 2004.
2. Fletcher, *An Engineering Approach to Digital Design*, 1st Edition, PHI, 2005.
3. John M. Yarbrough, *Digital Logic Applications and Design*, Thomson Publications, 2006.
4. A Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008.

II B.Tech. I Semester

10BT31001: THERMODYNAMICS AND FLUID MECHANICS

L	T	P	C
4	1	-	4

UNIT-I: Laws of Thermodynamics

Basic concept, Thermodynamic systems and processes, Zeroth law of Thermodynamics: Concept of temperature, First law of Thermodynamics: Concept of internal energy and enthalpy, applications to open and closed systems, Second law of Thermodynamics: Concept of entropy.

UNIT-II: Thermodynamic Air Cycles and Air Compressors

Introduction, Thermodynamic air cycles, Comparison of cycles, Concepts on properties of gases & gas mixtures.
Air compressors: Classifications, Working principles of Rotary and Positive displacement compressors, Single stage and Multistage compressors.

UNIT-III: Thermodynamic Vapour Power Cycles and Steam Boilers: Properties of steam, Thermodynamic vapour cycles, Rankine cycle with modifications, Types of Calorimeters, Steam boilers, Boiler Mountings and Accessories.

UNIT-IV: Refrigeration and Heat Transfer

Basic concepts of refrigeration, Various methods of producing refrigerating effects, Air conditioning process.
Basic concepts of Heat Transfer, One dimensional heat conduction: Plain wall and composite walls, Basic concept of Radiation.

UNIT-V: Basic Concepts of Fluid Mechanics

Introduction, Types of fluids, Properties, Laws of pressure, Atmospheric Pressure, Gauge Pressure. Pressure Measurement: Piezometer, Manometers and Mechanical Gauges.

UNIT-VI: Analysis of Flow of Fluids

Stream line, path line and streak lines and stream tube, classification of various fluid flows, Equation of Continuity for one dimensional flow, Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications on force on pipe bend, Flow measuring devices and its basic problems.

UNIT-VII : Dimensional and Model Analysis

Introduction, Dimensions, Dimensional Homogeneity, Methods of Dimensional analysis, Model analysis introduction, Similitude, Dimensionless Numbers and their significance, Model or Similarity laws.

UNIT-VIII : Hydraulic machines

Pumps: Basic concepts, Classifications, Working principles of Centrifugal and Reciprocating pumps.

Turbines: Basic concepts, Classifications, Working Principles of various turbines, efficiencies, basic problems.

TEXT BOOKS:

1. P.K.Nag, *Engineering Thermodynamics*, TMH.
2. R.K.Rajput, *Fluid Mechanics and Hydraulic Machines*, Revised 2nd Edition, S.Chand and company Ltd., 2002.

REFERENCE BOOKS:

1. R.K.Rajput, *Thermal Engineering*, Laxmi Publications (P) Ltd.
2. R.K.Bansal, *Fluid Mechanics*, Laxmi Publications (P) Ltd.
3. Dr. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*, S.K.Kataria and sons.
4. Dr. P.N.Modi and Dr. S.M.Seth, *Hydraulics and Fluid Mechanics Including Hydraulics Machines*, 18th Edition, Standard Book House, Rajsons Publications(P) Ltd, 2011.

II B.Tech. I Semester
10BT30403: SIGNALS AND SYSTEMS
(Common to ECE, EIE & EConE)

L T P C
4 1 - 4

UNIT-I: Signal Analysis

Signal definition, classification of signals, basic operations on signals, Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function.

UNIT-II: Fourier Series Representation of Periodic Signals

Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

UNIT-III: Fourier Transforms

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT-IV: Signal Transmission Through Linear Systems

System definition, classification of systems, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT-V: Convolution and Correlation of Signals

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-VI: Laplace Transforms

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, relation between L.T's and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT-VII: Sampling

Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-VIII: Z-Transforms

Discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. B.P. Lathi, *Signals, Systems & Communications*, BS Publications, 2003.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, *Signals and Systems*, 2nd Edition, PHI.
3. Simon Haykin and Van Veen, *Signals & Systems*, 2nd Edition, Wiley.

REFERENCE BOOKS:

1. M.E. Van Valkenburg, *Network Analysis*, 3rd Edition, PHI Publications, 2000.
2. Michel J. Robert, *Fundamentals of Signals and Systems*, MGH International Edition, 2008.
3. C. L. Philips, J.M.Parr and Eve A.Riskin, *Signals, Systems and Transforms*, 3rd Edition, Pearson Education, 2004.

II B.Tech. I Semester

10BT30411: SEMI CONDUCTOR DEVICES AND CIRCUITS LAB (Common to ECE, EIE & EConE)

L T P C
- - 3 2

PART A: (Only for viva voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs.
2. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIAC, TRIAC, Linear and Digital ICs.
3. Study and operation of
 - Multimeters (Analog and Digital)
 - Function Generator
 - Regulated Power Supplies
 - CRO.

PART B: (Minimum of 10 experiments to be conducted)

1. Forward and Reverse bias characteristics of PN Junction diode.
2. Zener diode characteristics and Zener as Voltage Regulator.
3. Input and Output characteristics of Transistor in CB Configuration.
4. Input and Output characteristics of Transistor in CE Configuration.
5. Half wave Rectifier With and without filters.
6. Full wave Rectifier With and without filters.
7. FET characteristics.
8. Measurement of h parameters of transistor in CE configuration.
9. Frequency response of CE Amplifier.
10. Frequency response of CC Amplifier.
11. Frequency response of Common Source FET Amplifier.
12. SCR Characteristics.
13. UJT Characteristics.

II B.Tech. I Semester
10BT30412: SIMULATION LAB
(Common to ECE, EIE & EConE)

L T P C
- - 3 2

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various signals and Sequences (Periodic and Aperiodic), Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, Sinc function.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of Signal.
5. Convolution between Signals and Sequences.
6. Autocorrelation and Cross correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a Given Continuous / Discrete System.
8. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the Given LTI System and Verifying its Physical Realizability and Stability Properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given Signal and plotting its Magnitude and Phase Spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating Zeros and Poles, and plotting the Pole-Zero maps in S-Plane and Z-Plane for the given Transfer Functions.
13. Generation of Gaussian Noise (Real and Complex), Computation of its Mean, M.S. Values and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling Theorem Verification.
15. Removal of Noise by Auto Correlation / Cross correlation in a given signal corrupted by noise.
16. Impulse response of a raised cosine filter.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationary in Wide Sense.

II B.Tech. II Semester
10BT41301: CONTROL SYSTEMS
(Common to ECE, EIE & EConE)

L T P C
4 1 - 4

UNIT-I: Introduction

Concepts of Control Systems, Open Loop and closed loop control systems, Feed-Back Characteristics, Effects of feedback, Block diagram representation of physical systems, Mathematical models-differential Equations.

UNIT-II: Transfer Function Representation

Analogous systems, electrical analogy of physical systems, Derivation of transfer function, Transfer function of DC Servo motor, Synchro transmitter and receiver, Block diagram algebra, Signal Flow graph and Mason's gain formula.

UNIT-III: Time Response Analysis

Types of test signals, Response of first and second order system, Time domain specifications, type and order of systems, steady state error, static error constants, generalized error co-efficients. Effect of P, PI, PID on time response.

UNIT-IV: Stability Analysis in S-Domain

Concepts of stability: Characteristic equation, location of roots in s-plane for stability, asymptotic stability and relative stability, Routh-Hurwitz stability criterion.

Root Locus Technique: Root locus concept, construction of root loci, effects of adding poles and zeros to $G(s)$ $H(s)$ on the root loci.

UNIT-V: Frequency Response Analysis

Introduction, Frequency domain specifications, Bode diagrams, Determination of Frequency domain specifications and transfer function from the Bode Diagram, Phase margin and Gain margin, Stability Analysis from Bode Plots.

UNIT-VI: Stability Analysis in Frequency Domain

Polar Plots, Nyquist plots, stability in frequency domain using Nyquist stability criterion, simple problems.

UNIT-VII: Design and Compensation of Control Systems

Introduction to Compensation networks, Lag, Lead, lead-lag compensation, Compensation using Bode plots.

UNIT-VIII: State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state model for physical systems Diagonalization, State Transition Matrix and its Properties, Solution of linear state equation, Concepts of Controllability and Observability, Kalman's test only.

TEXT BOOKS:

1. I. J. Nagrath and M. Gopal, *Control Systems Engineering*, 2nd Edition, New Age International (P) Limited.
2. Katsuhiko Ogata, *Modern Control Engineering*, 3rd Edition, Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. B.C.Kuo, *Automatic Control Systems*, Weilly Eastern, 2004.
2. Nise, *Control Systems Engineering*, 3rd Edition, John wiley.
3. Richard C. Dorf, Robert H. Bishop, *Modern Control Systems*, 11th Edition, Pearson Education, 2007.
4. Graham Goodwin, Stefan Graebe and Mario Salgado, *Control System Design*, Prentice Hall.

II B.Tech. II Semester

10BT41001: ELECTRICAL AND ELECTRONIC MEASUREMENTS

L T P C
4 1 - 4

UNIT-I: Ammeters and Voltmeters

Classification of analog instruments, operating forces: deflecting, control and damping. Construction, working principle and expression of torque equation for PMMC and Moving Iron Instruments. Ammeters and Voltmeters, Range extension of ammeters and voltmeters.

UNIT-II: Ohmmeters and Potentiometers

Series ohmmeter, shunt ohmmeter, multimeters. DC Potentiometers: Basic potentiometer circuit, standardization, Compton's Potentiometers, applications. AC Potentiometers: Standardization, Polar types and Coordinate types, applications.

UNIT-III: Power, Power Factor & Energy Meters

Construction, working principle and expression of torque equation for single phase electrodynamic wattmeter, single phase electrodynamic power factor meter and single phase induction energy meter. Testing of energy meter by direct loading, Phantom loading methods.

UNIT-IV: Bridges

Measurement of Resistance: Wheatstone bridge, Kelvin bridge, Kelvin double bridge and direct deflection methods. Measurement of Inductance: Maxwell bridge, Hay's bridge and Anderson bridge. Measurement of capacitance: Desauty's bridge and Schering bridge, Q-meter.

UNIT-V: Electronic Instruments

AC voltmeter using rectifiers, true RMS reading Voltmeter, electronic multimeter, digital voltmeters: ramp DVM, staircase ramp DVM, dual slope DVM and successive approximation DVM.

UNIT-VI: Frequency and Time Measurements

Frequency counters: Basic principle, errors associated with counter. Different modes of operations: Frequency, Time, Time Period, Average time period, Totalizing. Frequency synthesizer, Wave meters, Wave Analyzers, Output power meter.

UNIT-VII : Oscilloscopes

Motion of electron in electric and magnetic fields, electrostatic and magnetic focusing, deflection sensitivity in both cases, CRO operation, CRT characteristics, CRO probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operations, A, B, alternate & chop modes. Sampling oscilloscopes, storage oscilloscope. Standard specifications of CRO, synchronous selector circuits, Lissajous figures.

UNIT-VIII : Analyzers and Recorders

Spectrum analyzers, different types of spectrum analyzer, recorders, introduction to magnetic recording techniques & X-Y plotters. Display devices and display systems, logic analyzers.

TEXT BOOKS:

1. A.K.Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi, 1995.
2. H.S. Kalsi, *Electronic Instrumentation*, TMH, 2002.

REFERENCE BOOKS:

1. Cooper W.D & Hlefrick A.D., *Electronic Instrumentation & Measurement Technique*, 3rd Edition, PHI, 1991.
2. Doebelin, E.O., *Measurement Systems: Applications and Design*, 4th Edition, TMH, 2003.
3. David A. Bell, *Electronic Instrumentation and Measurements*, 2nd Edition, PHI, 2003.
4. E.W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, 5th Edition, Wheeler Publishing.

II B.Tech. II Semester

10BT31002: TRANSDUCERS IN INSTRUMENTATION

(Common to EIE & EConE)

L T P C
4 - - 4

UNIT-I: Introduction to Measurement and Transducers

Block diagram of Measuring System, Units and Standards, Measurement Errors, Statistical analysis of measurement data, Probability Errors, Limiting Errors, Principle of transducer, Classification of transducers.

UNIT-II: Performance Characteristics

Static characteristics: Calibration, accuracy, precision, sensitivity, linearity, resolution, hysteresis, threshold, reproducibility, repeatability, dead space, span, range.

Dynamic characteristics: Generalized mathematical model of measurement system. Zero order, first order and second order measurement systems and their response to Step, Ramp and Impulse inputs. Frequency response of first order and second order systems.

UNIT-III: Resistive Transducers

Potentiometers, strain gauges and their types, resistance temperature detector, thermistor, light dependent resistors.

UNIT-IV: Inductive Transducers

Variable reluctance, eddy current, linear variable differential transformers, electromagnetic, synchros, resolvers & inductosyn, magnetoelastic and magnetostrictive.

UNIT-V: Capacitive Transducers

Variable and differential dielectric, variable and differential gap between the plates, variable and differential area, frequency response, measurement of humidity, liquid level, displacement and pressure.

UNIT-VI: Self-Generating Transducers

Thermoelectric transducers, Piezoelectric transducers, Pyroelectric transducers, Photovoltaic transducers, force-balance transducers.

UNIT-VII: Signal Conditioning

Block diagram of signal conditioning, balance and deflection measurement in Wheatstone bridge, measurement of reactance: Push-pull bridge and Blumein bridge. Carrier amplifier, chopper amplifier, low drift amplifier and charge amplifier

UNIT-VIII: Digital and other Transducers

Position encoders, Transducer based on semiconductor junctions: Thermometers, magnetodiodes & magnetotransistors, photodiodes & phototransistors. Fiber-optic transducers, ultrasonic transducers. MEMS and Nanosensors.

TEXT BOOKS:

1. Ramon Pallas Areny, John G. Webster, *Sensors and Signal Conditioning*, 2nd Edition, John Wiley and Sons, 2000.
2. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi, 1995.

REFERENCE BOOKS:

1. *Sensor Technology Handbook*, Jon Wilson, 2004.
2. Herman K.P. Neubrat, *Instrument Transducers – An Introduction to Their Performance and Design*, Oxford University Press.
3. Doebelin, E.O., *Measurement Systems: Applications and Design*, 4th Edition, TMH, 2003.
4. Bentley J.P., *Principles of Measurement Systems*, Addison Wesley Longman Ltd, 4th Edition, 2003.
5. Patranabis D, *Sensors and Transducers*, 2nd Edition, PHI, 2003.

II B.Tech. II Semester
10BT40401: ELECTRONIC CIRCUIT ANALYSIS
(Common to ECE, EIE & EConE)

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4 - - 4

UNIT-I: Single Stage Amplifiers

Classification of Amplifiers – Distortion in amplifiers, Analysis of CE, CC & CB Configurations with simplified hybrid model, Analysis of CE amplifier with Emitter Resistance and Emitter Follower, Design of single stage RC Coupled Amplifier Using BJT.

UNIT-II: Multi Stage Amplifiers

Analysis of Cascaded RC Coupled BJT Amplifiers, Cascade Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers – RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers.

UNIT-III: BJT Frequency Response

Logarithms, Decibels, General Frequency Considerations, Frequency Response of BJT Amplifier, Analysis at Low and High Frequencies, Effect of Coupling and Bypass Capacitors, The Hybrid – π Common Emitter Transistor Model, CE Short Circuit Current Gain, Current Gain with Resistive Load, Single Stage CE Transistor Amplifier Response, Gain – Bandwidth product, Emitter Follower at Higher Frequencies.

UNIT-IV: MOSFET Amplifiers

Basic Concepts, MOSFET Small Signal Model, Common Source Amplifier with Resistive Load, Diode Connected Load and Current Source Load, Source Follower, Common gate stage cascade and folded cascade amplifier and their Frequency Response.

UNIT-V: Feedback Amplifiers

Classification of Amplifiers, Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of feedback on Amplifier Characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative Problems.

UNIT-VI: Oscillators

Conditions for oscillations, RC and LC Type Oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized Analysis of LC Oscillators, Quartz, Hartley and Colpitts Oscillators, RC-Phase Shift and Wien-Bridge Oscillators.

UNIT-VII: Large Signal Amplifiers

Class A Power Amplifier, Maximum Value of Efficiency of Class-A Amplifier, Transformer Coupled Amplifier, Transformer Coupled Audio Amplifier, Push Pull Amplifier - Complimentary Symmetry, Class - B Power Amplifier, Phase Inverters, Transistor power Dissipation.

UNIT-VIII: Tuned Amplifiers

Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers.

TEXT BOOKS:

1. Jacob Millman and Christos C. Halkias, *Integrated Electronics*, McGraw-Hill.
2. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, 9th Edition, PE, 2008.
3. David A. Bell, *Electronic Devices and Circuits*, 5th Edition, Oxford University Press.
4. Behzad Razavi, *Design of Analog CMOS Integrated Circuits*, TMS, 2008.

REFERENCE BOOKS:

1. Donald A. Neaman, *Electronic Circuit Analysis and Design*, 3rd Edition, Tata McGraw-Hill, 2007.
2. Robert T. Paynter, *Introductory Electronic Devices and Circuits*, 7th Edition, PEI, 2009.
3. Sedra/Smith, *Micro Electronic Circuits*, 5th Edition, Oxford University Press, 2009.
4. K. Lal Kishore, *Electronic Circuit Analysis*, BSP, 2004.
5. S. Salivahanan, N.Suresh Kumar, A. Vallavaraj, *Electronic Devices and Circuits*, 2nd Edition, TMH, 2009.

II B.Tech. II Semester

10BT40221: PRINCIPLES OF ELECTRICAL ENGINEERING

(Common to ECE, EIE & EConE)

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UNIT-I : Two Port Networks

Impedance parameters, admittance parameters, hybrid parameters, transmission (ABCD) parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two port networks in series, parallel and cascaded configurations, image parameters, illustrative problems.

UNIT-II : Filters

Classification of filters, filter networks, classification of pass band and stop band, characteristic impedance in the pass band & stop bands, constant-k Low pass filter, high pass filter, m-derived T-section, band pass filter and band elimination filter, illustrative problems.

UNIT-III : Symmetrical Attenuators

Symmetrical attenuators, T- type attenuator, Π - type attenuator, bridged T type attenuator, lattice attenuator.

UNIT-IV : DC Machines

Principle of operation of DC Machines- constructional features, EMF equation, Types of DC machines, Magnetization and load characteristics of DC generators, characteristics of DC motors, losses and efficiency, Swinburne's test, Speed control: flux and armature voltage control of DC shunt motor.

UNIT-V : Poly Phase System

Advantages of poly phase system over single phase system - phase sequence - star & delta connections, relationship between phase and line quantities, balanced and unbalanced circuits, power measurement in three phase systems using two wattmeter method - problems.

UNIT-VI : Transformers and their Performance

Principle of operation of single phase transformer, types, constructional features, phasor diagram on No load and load, equivalent circuit, losses and efficiency of transformer and regulation, OC and SC tests, predetermination of efficiency and regulation (simple problems).

UNIT-VII : Three Phase Induction Motors and Alternators

Principle of operation of three phase induction motors, slip ring and squirrel cage motors, alternators: constructional features, principle of operation, types, EMF equation (simple problems).

UNIT-VIII : Special Machines

Principle of operation - shaded pole motors, capacitor motors, AC servomotor, AC tachometers, synchros, stepper motor - characteristics.

TEXT BOOKS:

1. A. Sudhakar, Shyammohan S. Palli, *Network Analysis*, 3rd Edition, Tata McGraw-Hill, New Delhi, 2009.
2. B.L. Theraja and A.K. Theraja, *A Text Book Electrical Technology*, Vol - 2, S. Chand Company, New Delhi, 2010.

REFERENCE BOOKS:

1. John D. Ryder, *Networks, Lines and Fields*, 2nd Edition, Prentice Hall of India, New Delhi, 2009.
2. C.L. Wadhwa, *Network Analysis and Synthesis*, 3rd Edition, New Age International Publishers, 2007.
3. T.K. Nagasarkar and M.S. Sukhija, *Basic Electrical Engineering*, Oxford University Press, New Delhi, 2005.
4. W.H. Hayt and J.E. Kemmerly and S.M. Durbin, *Engineering Circuits Analysis*, 6th Edition, Tata McGraw-Hill, New Delhi, 2006.
5. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Engineering*, Tata McGraw-Hill, New Delhi, 2008.

II B.Tech. II Semester
10BT40402: PULSE AND DIGITAL CIRCUITS
(Common to ECE, EIE & EConE)

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UNIT-I: Linear Wave Shaping

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. High pass RC network as differentiator and Low pass RC network as integrator, attenuators and its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit. Problem solving.

UNIT-II: Non-Linear Wave Shaping

Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, applications of voltage comparators, clamping operation, clamping circuits taking source and diode resistances into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized clamping.

UNIT-III: Switching Characteristics of Devices

Diode as a switch, piecewise linear diode characteristics, Diode switching times, Transistor as a switch, Break down voltages, transistor in saturation, temperature variations of saturation parameters, Transistor-switching times, Silicon-controlled-switch circuits.

UNIT-IV: Multivibrator Circuits

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger Circuit using BJT, Concept of triggering, Symmetrical and asymmetrical configurations.

UNIT-V: Time Base Generators

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Transistor Current time base generators, Methods of linearity improvements.

UNIT-VI: SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Four Diode Sampling gate, Reduction of pedestal in gate circuits, Six diode gate, Applications of sampling gates.

UNIT-VII : Synchronization and Frequency Division

Principles of Synchronization of relaxation Devices, Frequency division in sweep circuit, Stability of relaxation devices, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit, A Sinusoidal Divider using Regeneration and Modulation.

UNIT-VIII : Realization of Logic Gates using Diodes & Transistors

AND, OR & NOT gates using Diodes & Transistors, DCTL, RTL, DTL, TTL and CMOS Logic families, Comparison between the logic families.

TEXT BOOKS:

1. J. Millman and H. Taub, *Pulse, Digital and Switching Waveforms*, McGraw-Hill, 1991.
2. David A. Bell, *Solid State Pulse Circuits*, 4th Edition, PHI, 2002.
3. Jacob Milliman, Christors C Halkias, *Integrated Electronics*, 1st Edition, TMH, 2004.

REFERENCE BOOKS:

1. A. Anand Kumar, *Pulse and Digital Circuits*, 2nd Edition, PHI, 2005.
2. L. Strauss, *Wave Generation and Shaping*, 5th Edition, TMH, 2010.
3. R.Venkataraman, *Pulse, Digital Circuits and Computer Fundamentals*, 3rd Edition, Dhanapat Rai Publications, 2005.

II B.Tech. II Semester
10BT40231: ELECTRICAL ENGINEERING LAB
(Common to ECE, EIE & EConE)

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Any SIX experiments from each part to be conducted

PART - A

1. Series and parallel resonance - timing, resonant frequency, bandwidth and Q-factor determination for RLC network
2. Time response of first order RL/RC network for periodic non-sinusoidal inputs - time constant and steady state error determination
3. Two port network parameters - Z and Y parameters
4. Two port network parameters - ABCD and h-parameters
5. Verification of Superposition and Reciprocity theorems
6. Verification of maximum power transfer theorem. Verification on both DC and AC
7. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test
8. Constant - k low pass filter and high pass filter - design and test

PART - B

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance
2. Swinburne's test on DC shunt machine (Predetermination of efficiency of a given DC shunt machine working as motor and generator)
3. Brake test on DC shunt motor. Determination of performance characteristics
4. Speed control of DC motor by
 - a. Field flux control method
 - b. Armature voltage control method
5. OC and SC tests on single-phase transformer (predetermination of efficiency and regulation at given power factors and determination of equivalent circuit)
6. Load test on single phase transformer
7. Brake test on three-phase induction motor. Determination of performance characteristics

II B.Tech. II Semester
10BT40411: ELECTRONIC CIRCUITS LAB
(Common to ECE & EIE)

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List of Experiments: (Minimum of Twelve experiments to be conducted)

I) Design and Simulation in Simulation Laboratory using Any Simulation Software.

(Minimum of Six Experiments to be conducted):

1. Common Emitter amplifier
2. Common Source amplifier
3. A Two Stage RC Coupled Amplifier
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. High Frequency Common base (BJT) / Common gate(JFET) Amplifier.

II) Testing in the Hardware Laboratory:

Any Three circuits simulations in Simulation laboratory

Any Three of the following

Class A Power Amplifier (with transformer load)

Class C Power Amplifier

Single Tuned Voltage Amplifier

Hartley and Colpitt's Oscillators

Darlington Pair

MOSFET Amplifier

II B.Tech. II Semester

10BT4HS02: **ADVANCED ENGLISH COMMUNICATION SKILLS**

(Audit Course)

(Common to ECE, EEE, EIE, EConE & BOT)

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UNIT-I: Vocabulary Building

Synonyms and Antonyms, Word roots, One-word substitutes, Prefixes and Suffixes, Study of word origin, Analogy, Idioms and Phrases.

Functional English: starting conversation, responding appropriately and relevantly, using the right body language, role play in different situations.

UNIT-II: Reading Comprehension

Reading for facts, Guessing meanings from context, Scanning, Skimming, Inferring meaning and Critical reading.

UNIT-III: Academic Essay Writing

Accuracy, Brevity, Clarity, Brainstorm, List your ideas, Sub-headings, Revising Content and Organisation.

UNIT-IV: Technical Report Writing

Types of formats and styles, Subject-matter, Subject-organization, Clarity, Coherence and Style, Planning, Data-collection, Tools, Analysis.

UNIT-V: Career Skills

Career direction, Exploring your talents, Personality inventories, Write a "Who I Am" statement, Thinking further, Perform career research, How do I get hired, Creating job satisfaction, Identify your satisfaction triggers, Positive attitude, Maintain a balanced lifestyle, Analyze your job in terms of your interests, Set goals to bring your interests and responsibilities in line, Personal SWOT analysis, Making the most of your talents and opportunities, Shaping your job to fit you better, Future proof your career, Managing your emotions at work, Get the recognition you deserve.

UNIT-VI : Resume Writing

Structure and Presentation, Planning, Defining the career objective, Projecting ones strengths and skill-sets, Summary, Formats and Styles, Cover letter.

UNIT-VII : Group Discussion

Dynamics of group discussion, Intervention, Summarizing, Modulation of voice, Fluency and Coherence, Participation, Relevance, Assertiveness, Eye contact and Body language.

UNIT-VIII : Interview Skills

Concept and Process, Pre-interview planning, Opening strategies, Answering strategies, Interview through Tele and Video-conferencing.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, *Effective Technical Communication Skills*, Tata McGraw Hill, New Delhi, 2005.
2. Meenakshi Raman and Sangetha Sharma, *Technical Communication, Principles and Practice*, Oxford University Press, New Delhi, 2010.
3. Santha Kumar R, *Secrets of Success in Interviews*, Crucial Books, Secunderabad, 2007.
4. M. Ashraf Rizvi, *Resumes and Interviews - The Art of Wining*, Tata Mc Graw Hill, New Delhi, 2008.
5. Gopala Swamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills: Attitude, Communication and Etiquette for Success*, Pearson Education, New Delhi, 2009.

SUGGESTED SOFTWARE:

1. TOEFL, GRE and IELTS (Kaplan, Aarco and Barrons, Cliffs)
2. Softwares from 'train2success.com'
3. Resume Preparation, K-Van Solutions.
4. Facing Interviews, K-Van Solutions.
5. Study Skills Success, (Essay, Vocabulary strategies, IELTS), Young India Films.
6. Vocabulary Builder, Young India Films.
7. E-correspondence, Young India Films.
8. Group Discussions, (Ease - 2), Young India Films.
9. Report Writer, Young India Films.