BAPATLA ENGINEERING COLLEGE
(*Autonomous*)
BAPATLA - 522 101.

SCHEME & SYLLABI for B.Tech
ELECTRONICS AND COMMUNICATION ENGINEERING
II Year (Semester I & II)
2011-2012

BAPATLA ENGINEERING COLLEGE : BAPATLA
(Autonomous)
SCHEME OF INSTRUCTION & EXAMINATION
FOR
ELECTRONICS AND COMMUNICATION ENGINEERING
w.e.f 2010-2011 (Semester System)

Second Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC211 /MA03	Mathematics – III	4	-		40	60	100	4
EC212	Data Structures using C	3	1		40	60	100	3
EC213 / EC02	Electronic Devices	3	1		40	60	100	3
EC214 /EI 02	Network Analysis and Synthesis	4	1		40	60	100	4
EC215 / EC03	Digital Electronics	4	1		40	60	100	4
EC216 / EC04	Electromagnetic Field Theory	4	1		40	60	100	4
EC251	Data Structures Lab			3	40	60	100	2
EC252 / ECL02	Electronic Devices Lab			3	40	60	100	2
EC253 / ECL03	Digital Electronics Lab			3	40	60	100	2
	TOTAL	22	5	9	360	540	900	28

CA: Continuous Assessment **FE:** Final Examination

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w.e.f 2010-2011 (Semester System)

Second Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC221 /MA04	Mathematics – IV	4	-		40	60	100	4
EC222 / EC05	Electronic Circuits – I	4	1		40	60	100	4
EC223 / EE04	Electrical Technology	3	1		40	60	100	3
EC224	Transmission Lines & Waveguides	4	1		40	60	100	4
EC225	Signals and Systems	4	1		40	60	100	4
EC226	Electronic Measurements and Instrumentation	3	1		40	60	100	3
EC261 / ECL04	Electronic Circuits –I Lab			3	40	60	100	2
EC262	PSPICE Lab			3	40	60	100	2
EC263	Signals & Systems lab			3	40	60	100	2
	TOTAL	22	5	9	360	540	900	28

CA: Continuous Assessment **FE:** Final Examination

EC211 / MA 03 **MATHEMATICS – III**
(CE/CH/CS/EC/EEE/EI/IT/ME)
II B.Tech. I Semester

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I **(16 Periods)**

Fourier integrals: From Fourier series to the Fourier integral, Application of the Fourier integral, Fourier Cosine and Sine integral, Evaluation of integrals, Fourier cosine and sine Transforms: Fourier Cosine Transforms, Fourier Sine Transforms, Linearity, Transforms of Derivatives, Fourier Transform: Complex form of the Fourier integral, Fourier Transform and its inverse, Linearity. Fourier Transform of Derivatives, Convolution.

UNIT – II **(16 Periods)**

Partial differential equations: Basic concepts, Modeling-Vibrating string, Wave Equation Separation of Variables Use of Fourier series, D'Alembert's Solution of the Wave Equation, Heat Equation-Solution Fourier series, Steady-State Two-Dimensional Heat Flow

UNIT – III **(16 Periods)**

Numerical Methods in general: Introduction, Solution of Equations by Iteration, newton's Method for Solving Equations f(x) = 0, Convergence of Newton's method, Interpolation: Lagrange interpolation, Newton's divided difference interpolation, Equal spacing: Newton's forward Difference formula, Newton's Backward Difference formula, Inverse interpolation, Numerical integration and Differentiation: Trapezoidal Rule, Error Bounds and Estimate for the Trapezoidal Rule, Simpson's Rule of integration, Error of Simpson's rule.

UNIT – IV **(16 Periods)**

Numerical methods in linear algebra: Linear Systems: Gauss Elimination, LU Factorization, Gauss-Seidel iteration Method, Method of least Squares, Methods of First order Differential Equations: Euler's method, Runge-Kutta methods, Methods for Elliptic Partial Differential Equations: Laplace equation, Poisson equation

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. "Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.

DATA STRUCTURES USING C

EC212

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

Arrays, Searching and Sorting: applications of arrays, bubble sort, selection sort, quick sort, insertion sort, merge sort, radix sort, shell sort, heap sort, linear search, binary search, hashing, hashing functions.

Linked Lists: concepts of linked lists, operations performed on singly linked list, doubly linked list, circular linked list, polynomial representation, sparce matrices.

UNIT II

Stacks: Basic concepts of stacks, implementation of stacks using arrays and linked list, stack applications such as infix to postfix expression conversion, evaluation of postfix expressions.

Queues: Basic concepts of queues, implementation of queues using arrays and linked list, circular queue, applications.

UNIT III

Trees: The concept of tree, Binary tree and its representation, Binary tree traversal, Binary search tree, Counting the number of nodes in a binary search tree, Searching for a target key in a binary search tree, deletion of a node from a binary search tree, AVL trees, operation performed on AVL trees, Splay trees, B trees, B+ trees.

UNIT IV

Graphs: Representations of graphs, Computing in-degree and out-degree of a node of a graph using adjacency matrix representation, Depth first traversal, Breadth first traversal, connected component of a graph, Depth first spanning tree, Breadth first spanning tree, Minimum cost spanning tree, directed acyclic graph (DAG).

TEXT BOOK

1. C & Data Structures, P.S. Deshpande and O.G. Kakde, Dreamtech Press, 2005.

REFERENCE BOOKS

2. C Programming and Data Structures, 3rd Edition, E. Balagurusamy, Tata McGraw Hill, 2007.
3. Introduction to Data structures in C, Ashok N.Kamthane, Pearson education, 2007.
4. Data Structures through C, Yashwant Kanetkar, BPB Publications.
5. Classic Data Structures 1e, Samanta, PHI, 2001.

ELECTRONIC DEVICES

EC213 / EC02

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSPORT PHENOMENA IN SEMICONDUCTORS: Insulators, semiconductors, and metals, Mobility and Conductivity, Electrons and holes in an Intrinsic semiconductor, Donor and Acceptor impurities, charge densities in a semiconductor, Electrical properties of Ge and Si, Hall Effect, Conductivity modulation, Generation and Recombination of charges, Diffusion, Continuity equation, Injected -minority carrier charge, Potential Variation within a Graded Semiconductor.

UNIT – II

JUNCTION DIODE CHARACTERISTICS: Open-circuited P-N Junction, P-N Junction as a Rectifier, Current Components in a p-n diode, The volt-ampere characteristic temperature Dependence of the V/I characteristic, Diode Resistance, Space-charge, or Transition, capacitance $C_{T,}$ Charge- control Description of a Diode, Diffusion Capacitance, Breakdown Diodes, Tunnel Diode, Photo Diode, LED Characteristics and areas of applications.

UNIT – III

BIPOLAR JUNCTION TRANSISTOR: NPN & PNP junction transistors, Transistor current components, Transistor as an Amplifier, CB Configuration, CE Configurations ,CE Cutoff& Saturation Regions, Typical Transistor- Junction Voltage Values, CE Current Gain, CC Configuration, Maximum Voltage Rating, Operating point, Bias Stability, Self-bias, or Emitter bias, Stabilization Against Variation in I_{CO},V_{BE}, and β, Bias Compensation Thermistor and Sensistor Compensation, Thermal Runaway, Thermal Stability

UNIT – IV

FIELD EFFECT TRANSISTER: JFET, Pinch-off Voltage V_P, volt-ampere characteristics, Depletion-MOSFET, Enhancement-MOSFET, Biasing the FET.

PNPN AND OTHER DEVICES: SCR, DIAC, TRIAC, UJT, and The Phototransistor (their characteristics only).

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics Analog and Digital Circuits and Systems,2_{nd} Edition,TMH, 2002

2. Robert L Boylested and Louis Nashelsky , Electronic Devices and Circuit Theory, 8th Edition, PHI, 2003

REFERENCE BOOKS:

1. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6th Edition, Pearson Education, 2004.

2. David A Bell, Electronic Devices and Circuits, 4th Edition, PHI, 2003

3. NN Bhargava, DC Kulshrestha and SC Gupta – Basic Electronics and Linear Circuits, TTTI Series, TMH, 2003.

NETWORK ANALYSIS AND SYNTHESIS

EC214 /EI 02

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

NETWORK FUNCTIONS : Poles and Zeros, Network functions for the one port and two port, Poles and zeros of network functions, Restrictions on pole and zero locations for driving point functions and transfer functions, Time domain behavior from the pole zero plot. **TWO PORT NETWORK PARAMETERS** : Two port network, Open circuit impedance, Short circuit admittance (Y), Transmission, Inverse transmission, Hybrid and inverse hybrid parameters, Relation between parameter sets, Interconnection of two port networks, Lattice networks, Image parameters

UNIT – II

FILTERS : Characteristic impedance of symmetrical networks, Properties of symmetrical networks, Filter fundamentals, Pass and stop bands, Characteristics impedance, Constant K low pass filter, Constant K high pass filter, m-derived T section, m-derived π Section, variation of characteristic impedance over the pass band, Termination with mderived half section, Band pass filters, Filter circuit design, Filter performance.

UNIT – III

ATTENUATORS: Symmetrical and Asymmetrical attenuators, T-type attenuator, π-type attenuator, Lattice attenuator, Bridged T attenuator, L-type attenuator.

EQUALIZERS: Equalizer configuration, Inverse network, Two terminal equalizer, Constant resistance equalizer, Full series equalizer, Full shunt equalizer, Bridged - T equalizer, Lattice equalizer.

UNIT – IV

NETWORK SYNTHESIS: Positive real functions, Positive real function properties, Testing driving point functions, Driving point function synthesis with two LC,RL,RC (Both cauer and foster forms) elements, Two port network synthesis by ladder development, series and parallel realizations.

TEXT BOOKS:

1. M.E.Vanvalkenburg, Network Analysis, 3rd Edition PHI, 2003.
2. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 3rd Edition, TMH, 2006.
3. John D Ryder, Networks, Lines and Fields, 2nd Edition, PHI, 2003.
4. Franklin F. Kuo, Network Analysis and Synthesis, 2nd Edition, Wiley India Ltd.,2005.

REFERENCE BOOKS:

1. M.E Vanvalkenburg, Introduction to Modern Network Systhesis, 2nd Edition, Wiley India Ltd,1986.
2. Vasudev K Atre, Network Theory and Filter Design, 2nd Edition, Wiley

DIGITAL ELECTRONICS

EC 215/EC03

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

NUMBER SYSTEMS: Decimal, Binary, Octal, Hexadecimal Number systems and their conversions, Addition, Subtraction, Multiplication and Division in different number systems. Representation of Binary numbers in Sign magnitude, 1's complement, and 2's complement form. Subtraction using Method of complements. CODES: Introduction, Binary codes, BCD codes, 8421 code, Excess -3 code, Gray code, Alphanumeric and Error detection codes. Error detection and correction using Hamming code

BOOLEAN ALGEBRA: Introduction, Boolean Postulates and theorems, Boolean functions and expressions. Canonical and standard forms of Boolean functions, Logic gates, Universal gates, Realization of Boolean functions using basic gates and universal gates.

UNIT – II

SIMPLIFICATION OF BOOLEAN EXPRESSIONS:

Simplification of Boolean functions Using K-Map method (Up to five variables), Quine-Mccluskey minimization technique (Tabulation Method)

COMBINATIONAL LOGIC CIRCUITS:

General design procedure for Combinational logic circuits, Half-adder, Full-adder, Half-subtractor, Full-subtractor, Carry Look-Ahead adder Comparators, Encoders, Decoders, Multiplexers and Demultiplexers, BCD to 7 Segment display Decoder, EX-OR, EX-NOR Circuits, Parity Generator, Parity Checker, Programmable Logic devices: PLA, PAL, ROM

UNIT – III

SEQUENTIAL LOGIC CIRCUITS:

Flip-flops: SR Flip-flop, JK flip-flop, T Flip-flop, D-Flip-flop. Characteristic Table, Characteristic Equation, Excitation table for SR, JK, D and T Flip-flops. Level triggering, Edge triggering, Master-Slave JK Flip-flop. Conversion from one type of Flip-flop to another. Analysis and Synthesis of Sequential Circuits

COUNTERS AND REGISTERS: Modulus of a Counter, Design of Ripple Counters: UP Counter, Down Counter, BCD Counter, Up/Down Counter using Flip-flops. Design of Synchronous Counters, Sequence generator Registers: Definition, Data movement in Registers, Registers Based on Data movement. Shift Registers: Shift Left Register, Shift Right Register, Bi-Directional Shift Register, Ring and Johnson Counters.

UNIT – IV

IC LOGIC FAMILIES: Characteristics of IC Logic families, RTL, DTL, I^2L, TTL, ECL, MOS, CMOS Logic families and their comparison.

TEXT BOOKS:

1. M Morris Mano, Digital Logic and Computer Design, PHI/Pearson Education, 2003.
2. RP Jain, Modern Digital Electronics, 3rd Edition, TMH, 2003
3. Fundamental of Digital Circuits, A.Anand Kumar, Pearson Education, 4th Edition

REFERENCE BOOKS:

1. Zvi Kohavi, Switching and Finite Automata Theory, 2nd Edition, TMH, 1978
2. Taub and Schilling, Digital Integrated Electronics, Mc-Graw Hill, 1977.

ELECTROMAGNETIC FIELD THEORY

EC 216/EC 04

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Electrostatics –I:

The experimental law of coulomb, Electric field intensity, Field due to a continuous volume charge distribution, Field of a line charge, sheet of charge. Electric Flux Density, Guass's law , Applications of Gauss law, Divergence, Maxwell's First equation (Electrostatics), Energy expended in moving a point charge in an electric field, The line integral, Definition of potential and potential difference. The potential field of a point charge, system of charges, potential gradient, the dipole and Energy density in electrostatic field.

UNIT – II

Electrostatics – II:

The nature of dielectric materials, boundary conditions for perfect dielectric materials. Capacitance. Several capacitance examples. Capacitance of a two wire line. Derivations of Poisson's and Laplace's equations, Examples of the solution of Laplace's equation. Current and current density, continuity of current, conductor properties and boundary conditions

UNIT – III

The Steady Magnetic Field: Biot-Savart Law, Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials Magnetic Forces and Materials: Force on a moving charge, Force on a differential current element, Force between differential current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and Permeability. Magnetic boundary conditions. Potential energy in magnetic fields.

UNIT – IV

Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current, Maxwell's equations in point form, integral form.

The Uniform Plane Wave: Wave propagation in free space, dielectrics. Poynting theorem and wave power. Propagation in good conductors: skin effect. Wave polarization. Reflection of uniform plane waves at normal incidence. Plane wave propagation in general directions. Plane wave reflection at oblique incidence angles.

TEXT BOOKS:

1. W H Hayt, J A Buck Engineering Electromagnetics, 7th Edition TMH, 2006.
2. Mathew NO Sadiku, Elements of Electromagnetics, Oxford University Press, 2003.
3. G S N Raju, Electromagnetic Field Theory and transmission lines, 1st Edition, Pearson Education India,2005.

REFERENCE BOOKS:

1. Joseph A Edminister, Theory and Problems of Electromagnetics, 2nd Edition, Schaum's Outline Series, Mc-Graw Hill International, 1993
2. EC Jordan and KG Balmain, Electromagnetic Waves and Radiating Systems,

DATA STRUCTURES LAB

EC 251

Laboratory	:	3 Periods/Week	Sessional Marks	:	40
University Exam	:	3 hours	University Examination Marks	:	60

List of Lab Programs

1. C program to perform the following operations on Singly Linked List
   i. Creation
   ii. Insertion
   iii. Deletion
   iv. Traversal
   v. Search
   vi. Display
2. C program to perform the following operations on Doubly Linked List
   i. Creation
   ii. Insertion
   iii. Deletion
   iv. Traversal
   v. Search
   vi. Display
3. C program to perform the following operations on Circular Linked List
   i. Creation
   ii. Insertion
   iii. Deletion
   iv. Traversal
   v. Search
   vi. Display
4. C program to perform addition of two polynomials.
5. C programs to implement stacks using arrays and linked lists.
6. C programs to implement queues using arrays and linked lists.
7. C program to convert the given infix expression into postfix.
8. C program to evaluate postfix expressions.
9. C program to implement insertion sort, selection sort, heap sort techniques.
10. C program to implement merge sort, radix sort, bubble sort techniques.
11. C program on linear search and binary search.
12. C program on B tree.
13. C program on B+ tree.
14. C program to perform Binary Tree traversal operations.
15. C programs to perform Binary search tree operations.

Note: A minimum of ten programs are to be executed and recorded to attain eligibility for University Practical examination.

ELECTRONIC DEVICES LABORATORY

EC 252/ ECL 02

Laboratory	:	3 Periods/Week	Sessional Marks	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Study of C.R.O
2. Characteristics of Silicon and Germanium diodes
3. Characteristics of Zener diode and regulator
4. Characteristics of Common Base configuration
5. Characteristics of Common Emitter configuration
6. Characteristics of Emitter follower circuit
7. Characteristics of JFET
8. Characteristics of UJT
9. Design and verification of self bias circuit
10. Characteristics of Silicon Controlled Rectifier
11. Characteristics of DIAC
12. Characteristics of LDR and Thermistor characteristics
13. Characteristics of source follower circuit
14. Design and verification of collector to base bias circuit
15. Characteristics of Photo transistor

NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

DIGITAL ELECTRONICS LABORATORY

EC 253/ ECL 03

Laboratory	:	3 Periods/Week	Sessional Marks	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half-Subtractor and Full-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Decoders like BCD – Decimal decoder.
6. Applications of IC Parallel Adder (1's & 2's compliment addition).
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De Multiplexers.
9. Verification of Truth Table of Flip-Flops using Gates.
10. Design of Shift register (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson Counters using Flip-Flops.
12. Conversion of Flip-Flops (JK-T, JK – D).
13. Design of Binary/Decade Counter.
14. Design of Asynchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.
15. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

MATHEMATICS – IV

EC221 / MA 04

(ECE/EEE/EIE/ME)

II B. Tech - II Semester

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Complex numbers and functions, conformal mapping:

Introduction to Complex Numbers, Derivative. Analytic Function, Cauchy's- Riemann equations. Laplace equation.

Geometry of analytic functions: conformal mapping, linear fractional transformations

UNIT – II

Complex Integration:

Line integral in the complex plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivates of analytic functions.

Unit – III

Taylor , Laurent series and Residue Integration

Taylor Series and Maclaurin series, Laurent Series, singularities and zeros. Infinity, Residue integration method, evaluation of Real Integrals.

UNIT – IV

Special Functions

Power Series method, Legendre's equation, Legendre Polynomials $P_n(x)$, Bessel's equation. Bessel functions $J_v(x)$.

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th Edition, John Wiley, 2000.

REFERENCE BOOK:

1. "Theory and Problems of Complex Variables", Murray R Spiegel, Schaum's outline series.

ELECTRONIC CIRCUITS – I

EC222 / EC05

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSISTOR & FET AT LOW FREQUENCY:

Graphical analysis of the CE Configuration, Two-port Devices and the Hybrid model, Transistor Hybrid model, Determination of h parameters from Characteristics, Measurement of h parameters, Analysis of transistor amplifier using h Parameter model, Emitter Follower, Millers theorem and its Dual, cascading transistor amplifiers, Simplified CE&CC Hybrid models, High input resistance circuits – Darlington pair, Boot Strapped Darlington pair, Cascode transistor amplifier, FET small signal model, CS / CD / CG configurations at low frequencies

UNIT – II

POWER AMPLIFIERS: Class A Large-signal amplifier ,Second-harmonic Distortion, Higher-order Harmonic Distortion, Transformer Coupled Audio Power Amplifier,Efficiency,Push-Pull Amplifiers Class B Amplifier ,Class AB Operation.

UNIT – III

FEEDBACK AMPLIFIERS: Classification of amplifiers, Feedback concept, Transfer Gain with Feedback, Negative feedback amplifiers and their characteristics, Input &Output resistance, Method of Analysis of a feedback amplifier, Voltage-series Feedback, Voltage-series Feedback pair, Current- series Feedback, Current- shunt Feedback ,Voltage-shunt Feedback.

UNIT – IV

OSCILLATORS: Barkhausen criterion for sinusoidal oscillators, RC phase shift oscillator using FET and BJT, Resonant circuit oscillators, General Form of Oscillator, Wien Bridge, Hartley, Colpitt's oscillators using BJT, Crystal oscillators, Frequency stability criterion for oscillators.

RECTIFIERS: Diode as a Rectifier, Half wave, Full wave and Bridge Rectifiers without filter and with inductor filter, Capacitor filter, L section and π- section filters.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, TMH, 2003.

2. A.P.Godse, U.A.Bakshi, Electronic Devices and Circuits , 2nd Edition, Technical publications, Pune, 2008.

REFERENCE BOOK:

1. Donald L. Schilling and Charles Belove, Electronic Circuits-Discrete and Integrated, 3rd Edition, TMH, 2002.

2. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6th Edition, Pearson Education, 2004.

3. Adel S. Sedra and Kenneth C.Smith, Microelectronic Circuits, 5th Edition, Oxford University Press, 2004.

4. NN Bhargava, DC Kulshrestha and SC Gupta – Basic Electronics and Linear Circuits, TTTI Series, TMH, 2003.

ELECTRICAL TECHNOLOGY

EC 223/EE04

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

DC MACHINES: Construction, Principle and operation of DC generator, EMF equation, Methods of excitation, DC motor principle, Back EMF, Torque equation, Load characteristics of DC shunt, series and compound generators, Motors, Losses and Efficiency, Applications of speed control, Swinburne's test, Three-point starter.

UNIT – II

Introduction to poly-phase system, Advantages, relationship between phase and line values for star and delta connection system.

TRANSFORMERS: Principle and Operation on no-load and load, Phasor diagrams, Equivalent circuit, Regulation, Losses and Efficiency, OC and SC tests, Auto transformers, Elementary treatment of 3 phase transformer connections, Star/star, Delta/star connections.

UNIT – III

THREE PHASE INDUCTION MOTORS: Construction, Rotating magnetic field, Principle of operation of Induction Motors, Torque equation, Torque-slip characteristics, Types of starters.

SINGLE PHASE INDUCTION MOTORS: Construction, Starting methods, Fractional Horse Power motors for tape recorders and teleprinters.

STEPPER MOTORS: Principle, Construction, Working and different types of Stepper motors.

UNIT – IV

SYNCHRONOUS MACHINES: Principle and constructional features of an alternator, EMF equation, Regulation-Synchronous impedance method, Synchronous motors, Principle of operation, Methods of starting and applications.

TEXT BOOKS:

1. Edward Hughes, "Electrical Technology", 6th Edition, Longman Group, 1987.
2. JB Gupta, "A Course in Electrical Technology", S K Kataria& Sons, 2003.
3. PC Sen, "Principles of Electrical Machines and Power Electronics", John Wiley, 1989.

REFERENCE BOOKS:

1. Vincent Del Toro, "Fundamentals of Electrical Engineering", Pearson Education.
2. H Cotton, "Advanced Electrical Technology", AH Wheeler & Co., 1990.
3. Eugene C Lister, "Electric Circuits and Machines", New York, MCGraw-Hill, 1975.
4. B.L Theraja&A.K.Theraja, "A Text Book of Electrical Technology", 23rd Revised Edition, S.Chand & Company Ltd., New Delhi, 2005.

TRANSMISSION LINES AND WAVEGUIDES

EC 224

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSMISSION LINES: Transmission line general solution, Attenuation constant and phase constant, Propagation constant, Problems on above, Computing primary and secondary constants. The infinite line, Wavelength, Velocity of propagation, Group velocity, Waveform distortion, The distortion less line, Telephone cable, Inductance loading of telephone cables, Reflection on a line not terminated in Zo, Reflection coefficient, Input and transfer impedance, Open and short circuited lines, Reflection factor and reflection loss, Insertion loss, T and section equivalents to lines, A line of cascaded T-sections.

UNIT – II

TRANSMISSION LINE AT HIGH FREQUENCIES: Parameters of open wire line at high frequencies, Parameters of coaxial lines at high frequencies, Constants for the line of zero dissipation, Voltages and current on dissipation line, Standing waves, Standing wave ratio, Input impedance of the dissipation less line, Input and output impedance of short circuited lines, Power and impedance measurement on lines, Reflection losses on the unmatched line, Single stub and double stub impedance matching on line using Smith chart.

UNIT – III

GUIDED WAVES: Waves between parallel planes, Transverse electric waves, Transverse magnetic waves, Characteristics of TE and TM waves, Transverse electromagnetic waves; Velocities of propagation, Attenuation in parallel plane guides.

RECTANGULAR WAVE GUIDES: Transverse magnetic waves, Transverse electric waves, Impossibility of TEM waves in hollow wave guides, Wave impedance and characteristic impedance, Field distribution in the transverse and longitudinal planes, Current flow on walls for dominant and other important modes, Attenuation factor and Q - factor of wave guide.

UNIT IV

CIRCULAR WAVE GUIDES: Solution of the field equation in cylindrical co-ordinates, TM and TE waves in circular guides, field distribution in the transverse and longitudinal planes.

STRIP TYPE TRANSMISSION LINES: Parallel plate transmission, Symmetrical strip transmission, Asymmetric strip transmission, other strip transmission lines.

TEXT BOOKS:

1. Electromagnetic waves by R.K.Shevgaonkar ,Tata McGraw Hill.
2. P A Rizzi, Micro Wave Engineering: Passive Circuits, PHI, 2002

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SIGNALS & SYSTEMS

EC225

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

SIGNAL ANALYSIS: Introduction to signals and systems, Classification of signals and systems (both discrete and continuous); Approximation of a function by a set of mutually orthogonal functions, Evaluation of mean square error, Orthogonality in complex functions, Trigonometric and Exponential Fourier series, Representation of a periodic function by Fourier series, Fourier transform, Properties of Fourier transforms, Fourier transform of simple functions, Dirichlet's conditions. Sampling theorem - statement and proof, Aliasing.

UNIT – II

SIGNAL TRANSMISSION THROUGH LINEAR NETWORKS: Linear time-invariant system, Time response, Convolution and it's graphical interpretation, Causality and stability, Paley-Wiener criterion, Frequency response, Filter characteristics of linear systems, Conditions for distortion less transmission, Relation between bandwidth and rise time.

SPECTRAL DENSITY AND CORRELATION: Energy and power spectral density, Properties, Auto-correlation and Cross-correlation functions, Properties of correlation function, Parseval's theorem.

UNIT – III

NOISE: Sources of Noise, Thermal Noise, Noise power spectral density, Noise calculation, Multiple sources-Superposition Of power spectra, Noise calculations in Passive circuits, Equivalent noise bandwidth, Noise-Figure of an amplifier, Power density and available power density, Effective input noise temperature, Effective noise temperature, Noise Figure in terms of available gain, Cascaded stages.

UNIT – IV

PROBABILITY& RANDOM VARIABLES: Definition of probability, Axioms of probability, Joint probability, Conditional probability, Total probability, Bayes' theorem, Independent events, Random variables, discrete and continuous, Probability Distribution Function, Probability Density Function, Guassian Random variable, Conditional distribution and density functions, Mean ,Variance and standard deviation of a random variable, Characteristic function, moment generating function, Central Limit Theorem.

RANDOM PROCESSES: Random process concept , stationarity and independence, correlation functions, Gaussian random process and Poisson random process, power density spectrum and its properties, relationship between power spectrum and autocorrelation function.

TEXT BOOKS:

1. B P Lathi, Signals, Systems and Communications, BSP, 2003
2. P.Z Peebles, Jr, Probability, random variables and random signal principles, TMH.
3. Simon Haykin, Signals and Systems, John Wiley, 2004

REFERENCE BOOKS:

1. A V Oppenheim,A S Wilsky & IT Young, Signals and Systems, PHI/ Pearson,2003
2. David K Cheng, Analysis of Linear Systems, Narosa Publishers, 1990.
3. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

EC226

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

MEASURENT AND ERROR: Definitions, Accuracy and precision, Types of errors, Statistical analysis, Probability of errors, Limiting Errors.

DIRECT CURRENT INDICATING INSTRUMENTS: PMMC, DC ammeters, DC voltmeters, Series type ohmmeter, Shunt type ohmmeter, Multimeter, Calibration of DC
Instruments, voltmeter sensitivity and loading effect.

DC & AC BRIDGES: Wheatstone, Kelvin, Guarded Wheatstone, Maxwell, Hay, Schering and Wein bridges, Wagner ground connection.

UNIT – II

ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS:

AC voltmeters using rectifiers, True RMS responding voltmeter, Electronic multimeter, Digital voltmeters: Ramp, Stair case ramp, Integrating, Successive approximation, Quantizing error; Frequency counter, Universal counter.

CATHODE RAY OSCILLOSCOPE: Introduction, Cathode ray oscilloscope, Storage and sampling oscilloscopes, Digital storage oscilloscope, Spectrum analyzer.

UNIT – III

TRANSDUCERS:

Introduction, Classification of transducers, Analog transducers, Resistive transducers, Potentiometers, Strain gauges, Types of strain gauges, Resistance strain gauges, Semiconductor strain gauges, Resistance thermometers, Thermistors, Application of Thermistors, Thermo couple construction, Measurement of thermocouple output, Compensating circuits, Advantages and disadvantages of thermocouples, Variable inductance type transducer, Variation of self inductance, Variation of mutual inductance, Linear variable differential transformer, Rotary variable differential transformer, Capacitive transducers, Piezo-electric transducers, Digital transducers, Shaft Encoder.

UNIT – IV

DATA ACQUISITION SYSTEMS: Digital Data Acquisition System, Various ways of multiplexing, Computer controlled instrumentation.

BIO-MEDICAL MEASUREMENTS: Bioelectric signals (ECG, EMG, ERG, EOG) and electrodes. Elementary Principles of Electrocardiograph, Electromyograph, Electroencephalograph.

TEXT BOOKS:

1. W D Cooper & A D Helfrick, Electronic Instrumentation and Measurement Techniques, PHI, 1998
2. A K Sawhney, Electrical and Electronics Measurement and Instrumentation, Dhanpat Rai, 2000
3. R S Khandpur, Hand Book of Biomedical Engineering, TMH, 2002

REFERENCE BOOKS:

1. C S Rangan, G R Sarma and V S V Mani, Instrumentation Devices and Systems, TMH, 1997
2. H S Kalsi, Electronic Instrumentation, TMH, 1995
3. John G.Webster, Medical Instrumentation: Application and Design, 3rd Edition, Wiley India Ltd, 2003.

ELECTRONIC CIRCUITS-1 LABORATORY

EC261/ECL04

Laboratory	:	3 Periods/Week	Sessional Marks	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Half Wave Rectifier with and without Filters.
2. Full Wave Rectifier with and without Filters.
3. Bridge Rectifier With and Without Filters.
4. Frequency Response of Common Emitter Amplifier.
5. Frequency Response of Common Source Amplifier.
6. Measurement of Parameters of Emitter Follower and Source Follower; RI, AV, AI &RO.
7. Cascode Amplifier.
8. Two Stage RC-Coupled Amplifier.
9. Voltage Series Feedback Amplifier.
10. Voltage Shunt Feedback Amplifier.
11. Complementary Symmetry Push-pull amplifier.
12. Class-A Power Amplifier.
13. RC Phase Shift Oscillator.
14. Colpitt's Oscillators.
15. Hartley Oscillators.

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NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

PSPICE LAB

EC262

Laboratory	:	3 Periods/Week	Sessional Marks	:	40
University Exam	:	3 hours	University Examination Marks	:	60

List of Lab Programs

Write the simulation programs and design using schematics for the following:

1. Low Pass and High Pass Filters
2. Half Wave and Full Wave Rectifiers
3. CE configuration
4. CC configuration
5. CS configuration
6. Wien Bridge Oscillator
7. Class A power amplifier
8. Pre-emphasis and De-emphasis
9. Clippers
10. Clampers
11. RC coupled amplifier
12. Voltage Regulator
13. Attenuators
14. Differential amplifier
15. Logic Gates

Note: A minimum of ten programs are to be executed and recorded to attain eligibility for University Practical examination.

TEXT BOOK

1. Introduction to PSpice using OrCAD for circuits and electronics, M. H. Rashid, Prentice Hall, 2004.

SIGNALS AND SYSTEMS LABORATORY

EC263

Laboratory	:	3 Periods/Week	Sessional Marks	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
5. Write a program to find the trigonometric and exponential fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
6. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
7. The signal x (t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal.

$$x(t) = \begin{cases} \cos(2\pi \times 47t) + \cos(2\pi \times 219t), & 0 \le t \le 10 \\ 0, & otherwise \end{cases}$$

8. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
9. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to find the autocorrelation and cross correlation of sequences.
11. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
12. Generate a Gaussian distributed length 1000 random sequence . Compute the mean and variance of the random signal by a suitable method.
13. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
14. Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
15. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response .

NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

Text Book: Contemporary Communication Systems using MATLAB by John G.Proakis, M.Salehi, Cengage Learning Publisher.