Scheme for I to VIII

B.TECH ELECTRICAL & ELECTRONICS ENGINEERING

(2006 Admission onwards)
B.TECH ELECTRICAL & ELECTRONICS ENGINEERING

NB: For all practicals from semester I & II to semester VII, 50% weightage is to be given for continuous evaluation and 50% for end semester examination

Semester I & II (Common to all branches)

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<th>Course Code</th>
<th>Subject Name</th>
<th>Hrs./ week</th>
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* 1 hour/week for environmental studies

Semester III

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<td>Strength of Materials</td>
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<td>Electric Circuit Theory</td>
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<td>Electrical Measurements &amp; Measuring Instruments</td>
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<td>Electrical Machines I</td>
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<td>Linear System Analysis</td>
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**Elective I**

- EB/EE 705 A: Computer Communications
- EE 705 B: High Voltage DC Transmission
- EE 705 C: Neural Network & Fuzzy Logic
- EE 705 D: Optimal Control Theory

### Semester VIII

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**Elective II**

- CS/EC/EE/EI 804 A: Digital Image Processing
- EE 804 B: Renewable Sources of Energy
- EE 804 C: Flexible AC Transmission
- EB/EE 804 D: VLSI Design

**CE/CS/EB/EC/EE/EI/IT/ME/SE 101 ENGINEERING MATHEMATICS I**

**MODULE I**
**Ordinary differential equations**: First order differential equations-Methods of solution and Simple applications- Linear differential equations of higher orders with constant co-efficients-Methods of solution of these equations, Cauchy’s linear differential equations. Simultaneous linear differential equations- Simple applications of linear differential equations in engineering problems –Electrical Circuits, Mechanical Systems

**MODULE II**

**Infinite series**: Integral test, comparison test, ratio test, Cauchy’s root test, Raabe’s test, series of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test (No proofs for any of the above tests)

**Power series**: Internal of convergence of power series, Taylor and Maclaurin series of functions, Leibniz formula for the nth derivative of the product of two functions (No proof), use of Leibniz formula for the determination of co-efficients of the power series.

**MODULE III**

**Partial differentiation**: Partial differentiation-Concept of partial derivative - Chain rule- Total derivative- Euler’s theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required)-Simple applications.

Taylors series expansion for a function on two variables-Simple problems

**Co-ordinate systems**: Rectangular co-ordinates-Polar co-ordinates-In plane and in Space-Cylindrical polar co-ordinates-Spherical polar co-ordinates.

**MODULE IV**

**Integral calculus**: Application of definite integrals: Area, Volume, Arc length, Surface area. Improper Integrals-Beta function-Gamma function

Multiple integrals: Evaluation of double integrals-Change of order of integration. Evaluation of triple integrals-Change of Variables in integrals. Applications of multiple integrals Plane Area, Surface area & Volumes of solids

**TEXT BOOKS:**
1. Engineering mathematics -Vol1:S.S.Sastry, PHI publishers

**REFERENCES:**
1. Mathematical Techniques: Oxford University Press
Module I:
Interference of light – Michelson interferometer – Applications-Interference in thin films – 
Antireflection coatings – Interference filters – Fringes produced by air wedge – Testing of flat 
surfaces- Diffraction of light –Zone plate - Plane diffraction grating - Reflection and transmission 
gratings – Determination of wavelength of light – Dispersive and resolving powers - Polarization 
of light – Double refraction – Nicol's prism – Quarter and half wave plates – Elliptically and 
circularly polarized light – Optical activity – Specific rotation – Half-shade polarimeter – 
Applications of polarized light.

Module II:
Types of lasers – Helium-Neon, Ruby and Semiconductor lasers – Applications of lasers – 
Principles of holography – Recording and Reconstruction of holograms – Applications of 
holography- Fiber optics – Light transmission through optical fiber – Numerical aperture – Multi 
and single mode fibers – Step index and graded index fibers – Fiber drawing – Fiber optic 
communication (basic ideas) – Ultrasonics – Generation of ultrasonic waves – Applications of 
Ultrasound.

Module III:
Quantum mechanics – Heisenberg's uncertainty principle - Experimental illustrations – Quantum 
mechanical wave equation – Time independent Schrodinger equation – Physical significance of 
wave function – Properties of the wave function – Solution of Schrodinger equation - Atomic and 
nuclear physics – The Vector atom model – Quantization of orbital angular momentum – Electron 
spin - Magnetic moment of orbital electron – Pauli’s exclusion principle– Zeeman effect – Stark 
effect – Raman effect. Nuclear physics – Nuclear forces – Properties of the nucleus - Nuclear 
reactions-Nuclear reaction cross section-Artificial radioactivity – Nuclear reactors – Nuclear 
fusion – Thermonuclear reactions-Thermonuclear reactions.

Module IV:
X-rays – Production of X-rays – Origin of X-rays and X-ray spectra – Moseley's law – Properties 
of X-rays – Applications of X-rays – Diffraction of X-rays by crystals – Bragg's law – 
Crystallography – Unit cell – Seven crystal systems – Bravais space lattices - Packing factor – 
Lattice planes and Miller indices – Energy bands in solids – Conductors, semiconductors and 
insulators – Intrinsic and extrinsic semiconductors – Conductivity of semiconductors – Fermi 
level - Applications of semiconductors – p-n junctions – solar cells – Hall effect and its 
applications – Superconductivity – Superconducing transition – The Meissner effect – Type I 
and Type II superconductors – Isotope effect - High temperature superconductors – Josephson 
effect – SQUIDS – Applications of superconductors

Text and Reference Books :

1. Jacob Philip – *A text book of Engineering Physics, Educational Publishers and Distributors*
   2002
2. A.S. Vasudeva – *Modern Engineering Physics, S. Chand & Co.*
3. M.R. Sreenivasan – *Physics for Engineers – New Age International*
Module I

Module II

Module III
Chemical Thermodynamics: Fundamentals, Molecular interpretation of internal energy, enthalpy and entropy, Heat of reaction, Kirchhofs equation, Trouton.s rule, Entropy changes accompanying different processes, Nernst heat theorem, Third-law. Free energy: Dependence on pressure and temperature, Gibbs-Helmholtz equation, Free energy changes and equilibrium constant, Chemical potential, Fugacity, Thermodynamics of biochemical reactions.

Module IV

Text Books
1. Peter Atkins and Julio de Paula  
   Elements of Physical Chemistry, Oxford University Press, 2005
2. Shashi Chawla  

References
1. Atkins, P.W.,  
   Physical Chemistry, Oxford University Press, UK, 1998
2. Bhatnagar, M. S.,  
3. Geoffrey Ozin, Andre Arsenault  
A) STATICS

MODULE I
Parallel forces in a plane: Two parallel forces. General case of parallel forces in a plane. Centre of parallel forces and centre of gravity, Pappus theorems, centroids of composite plane figures and curves. Distributed forces in a plane.

MODULE II

B) DYNAMICS

MODULE III

MODULE IV

TEXT BOOK & REFERENCES:

CE/CS/EB/EC/EE/EI/IT/ME/SE 105 ENGINEERING GRAPHICS

MODULE I
**Introduction to engineering graphics.** Drawing instruments and their use, familiarisation with current Indian Standard Code of Practice for general engineering drawing.
Scales- plain scale, vernier scale, diagonal scale.
Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, archimedian spiral and logarithmic spiral- drawing tangents and normals to these curves.

**MODULE II**
**Introduction to orthographic projections-** plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.
Orthographic projection of straight lines parallel to one plane and inclined to the other plane, straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.
Projection of plane laminae of geometrical shapes in oblique positions.

**MODULE III**
**Projection of polyhedra and solids of revolution-** frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.
Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

**MODULE IV**
**Development of surface of cubes, prisms, cylinders, pyramids and cones**
**Intersection of surfaces-** methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

**MODULE V**
**Introduction to isometric projection-** isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.
**Introduction to perspective projections :** visual ray method and vanishing point method- perspective of circles- perspective views of prisms and pyramids.

**TEXT BOOKS & REFERENCES:**

2. Elementary engineering drawing N.D.Bhat, Charotar publishing house
CE/CS/EB/EC/EE/EI/IT/ME/SE 106 BASIC CIVIL AND MECHANICAL ENGINEERING

(A) CIVIL ENGINEERING

MODULE I
Aggregates- types & requirements of good aggregates. Concrete- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.
Construction : Foundation- types of foundations- isolated footing, combined footing, raft, pile & well foundations,

MODULE II
Super structure : Brick masonry, English bond and Flemish bond , Stone masonry, Random rubble masonry. Roofing- Steel trusses, roofing for industrial buildings
Surveying: Principles, instruments, ranging and chaining of survey lines, errors in chaining, field work, field book, selection of survey stations, reconnaissance .
Levellng : Levelling instruments, different types, temporary adjustments, mean sea level, reduced level of point, booking of field notes, reduction of levels by height of collimation method.

Text Books & References :
1. Engineering materials : Rangawala
2. Building construction : Punmia
5. A Text book of building construction : Jha & Sinha
6. Surveying & Levelling : T P Kanetkar
7. Surveying & Levelling : Hussain

(B) MECHANICAL ENGINEERING

MODULE III
Thermodynamics: thermodynamic systems - open, closed and isolated systems, equilibrium state. of a system, property and state, process, cycle, work, Zeroth law of thermodynamics-concept of temperature, temperature scales. First law - internal energy, enthalpy. Second law - Kelvin-Plank and Clausius statements, Carnot Cycle.
Refrigeration and Air conditioning: Vapour compression and vapour absorption refrigeration systems, summer and winter Air conditioning, Comfort and industrial Air conditioning.
Elementary ideas of simple reaction and impulse turbines, compounding of turbines.

MODULE IV
Internal Combustion Engines: working of two stroke and four stroke Petrol and Diesel engines, simple Carburettor, ignition system, fuel pump, fuel injector, cooling system, lubricating system.
Transmission of Power: Belt drives (open and closed), chain drives.
Metal fabrication: Welding - Arc, gas, resistance welding, Welding defects, Soldering, Brazing

Text Books & References:
1. Engineering Thermodynamics : P.K.Nag
3. Engineering Thermodynamics : Van Wylon
5. Thermodynamics : J.P.Holman
8. Refrigeration and Air Conditioning.: Stoecker Tata McGraw Hill

CE/CS/EB/EC/EE/ EI/IT/ME/SE 107 BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(A) ELECTRICAL ENGINEERING

Module I
Basic principles of Electric circuits: Review of Ohms law - Definition of resistance, current, voltage and power - Series and parallel circuits- constant voltage source and constant current source.
Network Theorems: Kirchoff’s laws- Network analysis by Maxwell’s circulation currents - Thevenin’s theorem - Superposition theorem -Norton’s theorem - Simple illustrative problems on network theorems.
Review of electrostatics - Coulomb’s Law - Electric field strength and Electric flux density-capacitance.

Module II

(B) ELECTRONICS ENGINEERING

Module III
Transistors: - PNP and NPN transistors - theory of operation - Transistor configurations - characteristics - comparison.
Special semiconductor devices - FET - SCR - LED - LCD – V-I characteristics, applications.

Module IV
Fundamentals of Instrumentation: Transducers - Definition - Classification – Active & passive - Transducer for position, pressure, velocity, vibration and temperature measurements.
CRÓ – principle of operation - measurement of amplitude, frequency and phase.
Fundamentals of Communication: Analog communication - concept of modulation, demodulation. Types: AM - FM -PM- Block diagram of general communication system -Basic concepts of digital communication - Block diagram.
Text Book:
Further References:
1. Electrical Technology : Edward Hughes, Addison Wesley Publication
Module I

Introduction to programming in C: Fundamental data types- integer, floating point, and enumerated data types, Expressions – arithmetic, relational and logic operators, Type conversion – simple and compound statement, Access to standard library, standard I/O-getchar, putchar, Formatted I/O, scanf, printf, error handling, line input and output, control structures, selection statement, IF, SWITCH, WHILE, DO WHILE, FOR, BREAK, CONTINUE, GOTO, RETURN statements.

Module II

Functions: Declarations and functions, parameter passing mechanism, storage classes-scope, visibility, and life time of variables, AUTO, EXTERN, STATIC and REGISTER modifiers, Recursion.

Module III

Arrays: Single and multi dimensional arrays, sorting, selection sort, search-linear search and binary search, Structures and union.

Module IV

Pointers: Pointers and addresses, pointer arrays, function returning pointers, pointers to function, pointer arithmetic, pointers to structures, array of structures, preprocessor directive, command line arguments, typedef.

Text Book & References:

1. Computer Fundamentals & Programming in C : Pradip Dey & Manas Ghosh (OXFORD)
2. Computer Fundamentals : Dr. Varghese Paul (EPD)
3. Programming in C : B.S. Gotfried (Schaum series, TMH)
Module I (25 hours)

**Oral Communication:** starting and ending a conversation; telling and asking people to do things; expressing opinions and ideas, decisions and intentions, offers and invitations, feelings, right and wrong, numbers and money.

Purpose and audience; dealing with customers and clients; face-to-face discussions; meetings and attending meetings; checking understanding; raising questions; giving and receiving feedback; using body language; leading and directing discussions; concluding discussions; using graphics in oral presentations.

**Reading Comprehension and reference skills:** skimming and scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; comprehending graphics in technical writing.

Reading strategies; reading speed; reading between the lines for hidden meaning; interpreting graphics; using a dictionary; using an index; using a contents list to find information; choosing the right reference source.

Module II (20 hours)

**Written Communication:** note making and note taking; summarising; notes and memos; developing notes into text; organisation of ideas: cohesion and coherence; paragraph writing: ordering information in space and time; short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts; diagrams and flow-charts; maps, plans and graphs.

Spelling rules and tips; writing a rough draft; editing and proof reading; writing the final draft; styling text; filling in complex forms; standard letters; CV; writing a report; writing leaflets and brochures; writing references; essay writing: expository writing; description of processes and products; classification; the instructional process; arguments and presentation of arguments; narrating events chronologically.

Module III (15 hours)

**Science, Technology and Ethics**


Responsibilities and Rights of engineers – Collegiality and Loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Professional rights.

Module IV

**Environmental Studies:** (30 hours)
Natural resources – issues related to the use and over exploitation of forest resources, water resources, mineral resources, food resources and energy resources – role of an individual in conservation of natural resources – equitable use of resources for sustainable life styles.
Concept of an ecosystem – structure and function – energy flow in the ecosystem – ecological succession - food chains, food webs and ecological pyramids – structure and functions of a forest ecosystem and an aquatic eco system.
Definition of biodiversity – genetic, species and ecosystem diversity – biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, marine pollution, thermal pollution and nuclear hazards – Causes, effects and control measures of urban and industrial solid wastes – Role of an individual in prevention of pollution - An overview of the various environmental legislations in India – Issues involved in enforcement of environmental legislation.

Text Books:

Meenakshi Raman and Sangeetha Sharma

Technical Communication : Principles and Practice,
Oxford University Press, 2004

Rajagopalan. R

Environmental Studies : From Crisis to Cure,
Oxford University Press, 2005

Jayashree Suresh and B.S. Raghavan

Professional Ethics,
S. Chand & Company Ltd, 2005.

WC Dampier

History of Science, Cambridge University Press.

References:

Adrian Doff & Christopher Jones,


Krishna Mohan & Meenakshi Raman,


Edmund D. Seebaur & Robert L. Barry

Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, 2001

Krishna Mohan & Meera Banerji


Rajendra Pal & JS Korlahalli

Essentials of business communication, S. Chand & Company Ltd

Sarah Freeman,


Meenambal T, Uma R M and K Murali

Principles of Environmental Science and Engineering, S. Chand & Company Ltd, 2005

University Examination pattern
The question paper will have two parts. Part A (Technical Communication) will cover Modules I, II and will have a weightage of 50 marks. Part B (Social Sciences) will cover Module III
and Module IV (Environmental Studies) and will have a weightage of 50 marks. Part A and Part B will have to be answered in separate answer books.

**Part A**

<table>
<thead>
<tr>
<th><strong>University examination pattern</strong></th>
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</thead>
<tbody>
<tr>
<td>Q I - 4 short type questions of 5 marks, 2 each from module I and II</td>
</tr>
<tr>
<td>Q II - 2 questions A and B of 15 marks from module I with choice to answer any one</td>
</tr>
<tr>
<td>Q III - 2 questions A and B of 15 marks from module II with choice to answer any one</td>
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</tbody>
</table>

**Part B**

<table>
<thead>
<tr>
<th><strong>University examination pattern</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q I - 5 short type questions of 4 marks, 2 from module III and 3 from module IV</td>
</tr>
<tr>
<td>Q II - 2 questions A and B of 10 marks from module III with choice to answer any one</td>
</tr>
<tr>
<td>Q III - 2 questions A and B of 20 marks from module IV with choice to answer any one</td>
</tr>
</tbody>
</table>

**CE/CS/EB/EC/EE/EI/ME/IT/SE 110**

**COMPUTER PROGRAMMING LABORATORY**

1. Study of OS commands. General introduction to application packages.
3. Searching & sorting
4. Creation and use of databases in a suitable database package
5. Programming exercises in C.

**CE/CS/EB/EC/EE/EI/ME/IT/SE 111**

**ELECTRICAL AND MECHANICAL WORKSHOPS**

**ELECTRICAL WORKSHOP**

1. One lamp controlled by one switch
2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluorescent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
10. Soldering practice.
11. Familiarisation of CRO.

**MECHANICAL WORKSHOP**

1) Fitting Shop.
2) Sheet Metal Shop
3) Foundry Shop
4) Welding Shop
5) Carpentry Shop
   (Preliminary exercises for beginners in all shops. Specific models may be designed by the teachers.)

Introduction to the use of concrete mix.
CE/CS / EB/ EC /EE/ EI/IT/ ME/SE 301 ENGINEERING MATHEMATICS II

Module I
Vector Spaces- Subspaces, -Linear Independence of vectors-Linear span-Dimension and Basis.
Linear transformations.

Module II
Fourier series and Fourier integrals: Fourier series of Periodic functions-Euler formulae for Fourier coefficients- functions having period $2\pi$, arbitrary period- even and odd functions-half range expansions, Fourier integral, Fourier cosine and sine transformations, linearity property, transform of derivatives, convolution theorem (no proof)

Module III
Laplace transforms: Linearity property, transforms of elementary functions, Laplace transforms of derivatives and integrals, differentiation and integration of transforms, convolution theorem (no proof), use of Laplace transforms in the solution of initial value problems, unit step function, impulse function - transform of step functions, transforms of periodic functions.

Module IV
Vector calculus: Scalar and Vector point functions-Gradient and directional derivative of a scalar point functions. - Divergence and Curl of a vector point functions- their physical meanings.
Evaluation of line integral, surface integral and volume integrals, Gauss’s divergence theorem, Stoke’s theorem (No Proof of these theorem), conservative force fields, scalar potential.

Text books:

References:
1. Larry C Andrews, Ronald C Philips, Mathematical Techniques For Engineers & Scientists, Phi Publishers

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE302 FLUID MECHANICS & HEAT ENGINES

Module I

Fluids and their properties: Fluids, shear stress in a moving fluid, viscosity, Newtonian and non-Newtonian fluids, viscosity in liquids and gases. Fluid statics: pressure, variation of pressure in a static fluid, absolute and gauge pressure, measurement of gauge pressure. Kinematics of fluid flow: Eulerian and Langragain approaches, classification of fluid flow as steady and unsteady flow, uniform and non uniform flow, laminar and turbulent flow, Path line, stream line, streak line and stream tube, one, two, and three dimensional flow, velocity and accelerations in steady and unsteady flow. Basic Hydrodynamics: Ideal fluids, equations of continuity in the differential form, rotational and irrotational flow, circulation and vorticity, Stream function, Velocity potential, one dimensional flow along a stream line, Bernoulli’s equation and its limitations, measurement of velocity, Pitot tube and Pitot-static tube, venturi meter, orifice meter, flow nozzles, notches and weirs.

Module II

Steady flow of incompressible fluids in pipes: Laminar and turbulent flows, critical Reynolds number, hydraulic radius, general equation for friction, laminar flow in circular pipes, Darcy- Weisbach equation, friction factor, equivalent pipes, minor losses in pipes, Development of boundary layer. Dimensional Analysis & Similitude: Rayleigh’s method, Buckingham’s Pi theorem, nondimensional parameters in fluid mechanics and machinery – principles of similitude – geometric, kinematic and dynamics similarities – model studies. Physical meaning of important dimensional groups of fluid mechanics and their practical use.

Module III

Dynamic action of fluid: Momentum equation applied to a control volume, impact of jets, flow of an incompressible fluid over fixed and moving vanes, work done and efficiency. Hydraulic turbines: velocity triangles, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine, their constructional features and performance characteristics – non dimensional parameters for comparative study of turbine performance, theory of draft tubes, speed regulation of turbines, selection of type and speed of turbines.

Module IV

Pumping machinery: general features of positive displacement and rotodynamic pumps, centrifugal pumps, classification, principle of working, velocity diagrams, losses in pumps, circulatory flow, multistage pumps, propeller pumps, priming, cavitation and its significance. Reciprocating pumps: Acceleration head, effect of friction, use of air vessels, efficiencies, pump characteristics.
References:
Douglas, Gasiorek, and Swaffield: Fluid mechanics – Pitman
Dr. Jagdish Lal: Hydraulic mechanics, Metropolitan book Co. Delhi-6
F.M White: Fluid Mechanics.
Massery : Fluid Mechanics – ELBS
Herbert Addison: A Treatise on applied hydraulics.
Som & Biswas : Introduction to fluid Mechanics & Machinery (TMH)
Agarwal: Fluid mechanics & Machinery, TMH.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
CE/EE 303 STRENGTH OF MATERIALS

Module I
Tension, Compression and Shear: Normal stresses and strains – Mechanical properties of mild steel – Elasticity, plasticity and creep – Linear elasticity, Hooke’s law and Poisson’s ratio – Shear stress and shear strain – Allowable stresses and allowable loads – design for axial loads and direct shear

Axially loaded Members: Changes in lengths of axially loaded members – Changes in lengths of nonuniform bars – Thermal effects, misfits and prestrains – stress on inclined sections – strain energy

Module II
Torsion: Torsional deformation of circular bar – Circular bars of linearly elastic materials – nonuniform torsion – stresses and strains in pure shear – relationship between modulus of elasticity, bulk modulus and rigidity modulus – transmission of power by circular shafts – Circular shafts fixed on both ends – strain energy in torsion and pure shear

Shear forces and bending moments: Types of beams, loads and reactions – shear forces and bending moments – relationships between loads, shear forces and bending moments – Shear force and bending moment diagrams

Module III
Stresses in beams: Pure bending and non uniform bending – Curvature of a beam – Longitudinal strains in a beam – Normal stresses in beams (linearly elastic materials) – Design of beams for bending stresses – Nonprismatic beams – Shear stresses in beams of rectangular cross section – Shear stresses in beams of circular cross section – Shear stresses in webs of beams with flanges

Analysis of stress and strain: Plane stress – Principal stresses and maximum shear stresses – Mohr’s circle for Plane stress – Hooke’s law for plane stress – Maximum stresses in beams – Plane strain

Module IV
Deflection of determinate Beams: Differential equation of deflection profile – Deflection by integration of the bending moment equations – Deflection by integration of the shear-force and load equation – Method of superposition – Moment area method

Columns: Buckling and stability – Columns with pinned ends – Columns with other support conditions – Columns with eccentric axial loads – The secant formula for columns

Text Book

Reference
Popov E.P.- Engineering Mechanics of Solids, Printice-Hall of India Limited, New Delhi,
Timoshenko S.P. and Young D.H - Elements of strength of materials, East-West Press
Private Limited New Delhi, India.
Nash – Strength of Materials – Shausm’s OUTlines, McGraw Hill

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 304 ELECTRIC CIRCUIT THEORY

Module I
Review of network theorem – superposition, reciprocity, Thevenin’s, norton’s, maximum power transfer theorem mesh and node analysis by inspection – network topology – definition of graph, tree, incidence matrix, cutset, tie set, application of graph theoretic methods to formulation of network equation – current variable and voltage variable methods.

Module II
Two port networks - characterization in terms of impedance, admittance, hybrid and transmission parameters – inter relationship among parameter sets – reciprocal and symmetrical two port networks – inter connection of two port network – I and II equivalent of a two port network – image impedance – characteristic impedance and propagation constant of a symmetrical two port network.

Module III
Polyphase systems – balanced and unbalanced loads – unbalanced three wire and four wire star connected load – displacement neutral method – power measurement using wattmeter.
Circuit transients – direct current transients - RL, RC, RLC transients – alternating current transients – application of laplace transform for transients analysis.

Module IV
Fourier transform and inverse fourier transform – properties of fourier transforms – continuous amplitude and phase spectra.
Filters – analysis of constant K and derived filters.
Network synthesis – foster and cauer forms.

Text Book

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 305 ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Module I

Module II

Module III

Module IV

Reference:

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module 1
DC power supplies - power transformers - rectification - half wave, full wave, bridge - expression for ripple factor, efficiency, comparison, diode ratings. filters - capacitor - inductor LC filters- use of bleeder resistor - voltage multipliers - dual power supplies - zener and avalanche diodes - simple and series voltage regulator. Special semiconductor devices: Principles and operation of photodiodes, PIN diodes, phototransistors, LED, UJT. MOSFET- basic principles & characteristics.

Module 2
FET Amplifiers: Principle of operation, characteristics, Common source amplifier-design, frequency response-applications

Module 3
Power amplifier - classification - class A, B, AB and C power amplifiers-tuned amplifier-pushpull and complementary symmetry power amplifier –Harmonic distortion– Heat sinks.
Feed-back amplifiers: concept of Negative and positive feedback – Bark Hausen criteria -low frequency sinusoidal oscillators
High frequency oscillators – types- LC, Crystal oscillators –circuit diagram-description-applications

Module 4
Pulse Circuits:-Different types Pulse circuits - pulse characteristics - Pulse shaping using RC circuits - Differentiating and integrating circuits –applications. Clipping and clamping circuits using diodes - Transistor as a switch– simple sweep circuits-bootstrap sweep.
Multivibrators-astable, monostable and bistable ciruits using BJTs-applications

Text book:
Boylestead & Neshelsky; ,”Electronic Devices & Circuit Theory”, PHI2003
Millman & Halkias, ”Electronic Devices & Circuits”, TMH, New Delhi.1996
Taub & Schilling, Pulse, Digital and Switching ciruits, TMH, New Delhi

References:
Allan Mottorshed, ” Electronic Devices & Circuits”, PHI, New Delhi.
Schilling & Belove “Electronic Circuits, Discrete & Integrated”, TMH, New Delhi 1989

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
CS/EE 307 ELECTRONIC CIRCUITS LAB

1. Study of Multimeter, Signal generators, CRO etc. and measurement of electrical quantities
2. Testing of Passive and Active components - Resistors, Capacitors, inductors, Transformers, diodes, Transistors, etc.
3. Characteristics of Active devices
4. Rectifying circuits
   i) HW rectifier
   ii) FW rectifier
   iii) FW Bridge rectifier
   iv) Filter circuits - Capacitor filter, inductor filter and Pi section filter
      (Measurement of ripple factor, maximum ratings of the devices)
5. Differentiating circuit and integrating circuit.
6. Clipping & Clamping circuits.
7. Amplifying circuits - Simple common emitter amplifier configuration - gain and bandwidth.
8. Oscillators –
9. Multivibrators – A stable only.
10. Circuits using OP- Amps

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.
EE 308 BASIC ELECTRICAL ENGINEERING LAB

1. Determination of the voltage-current characteristics of linear resistance and an incandescent lamp.
3. Potential divider connection of rheostat and dependence of output voltage upon the value of the load resistance.
4. Study of PMMC and MI voltmeters and ammeters, dynamometer type wattmeter, clip on ammeter, standard symbols on the dials of the meters.
5. Verification of Kirchhoff’s laws using rheostats.
6. Verification of superposition theorem in a resistive circuit with two given d.c. sources.
7. Verification of Thevenin’s theorem in d.c. circuits.
8. Verification of generalized Reciprocity theorem in a d.c. circuit.
11. Determination of fusing time versus current characteristics for two specimens – Fusing factor – study of various types of fuses.
   a) Single wattmeter method.
   b) Two wattmeter method.

Student shall present his/her fair record, notebook duly certified by the Head of the Department, to the examiners at the time of University practical examination.

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.
Module I

**Complex Analytic functions and conformal mapping:** curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy - Riemann equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions.

Conformal mapping: Linear fractional transformations, mapping by elementary functions like $z^2$, $e^z$, $\sin z$, $\cos z$, $\sin hz$, and $\cos hz$, $Z+1/Z$.

Module II

**Complex integration:** Line integral, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

Module III

**Partial differential equations:** Formation of partial differential equations. Solutions of equations of the form $F(p, q) = 0$, $F(x, p, q)=0$, $F(y, p, q)=0$, $F(z, p, q)=0$, $F(x, p) = F(y, q)$, Lagrange’s form $Pp + Qq = R$. Linear homogeneous partial differential equations with constant coefficients.

Module IV

**Vibrating string:** one dimensional wave equation, D’Alembert’s solution, solution by the method of separation of variables. One dimensional heat equation, solution of the equation by the method of separation of variables. Solutions of Laplace’s equation over a rectangular region and a circular region by the method of separation of variables.

Text Books:


References:


**Type for questions for University Exams**

**Question (1)** - Eight short answer question of five marks with two questions from each of four modules

**Question (2-5)** - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module I


Module II


Module III

Memories – ROM, RAM, EPROM, EEPROM Programmable logic array, devices – basic ideas – PLD architecture – PAL and PLA – programmable examples with software tools.

Module IV

Logic families: RTL, DTL, TTL, ECL, and CMOS – tristate logic – specification and transfer characteristics of basic TTL interfaces, - standard logic levels – current and voltage parameters – fan in and fan out – propagation delay, integrated circuits modules, noise consideration – interfacing of CMOS to TTL and interfacing of TTL to CMOS.

TextBook:-
1) Taub & Schilling - *Digital Integrated Electronics*

Reference:
1) Samuel C Lee - *Digital Circuits and Logic Design*
2) A P Malvino - *Digital Computer Electronics*
3) Morris & Miller - *Design with TTL Integrated Circuits*

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module I

DC generators: Principle of DC generators, constructional details, field, armature and commutator or magnetic circuits, field flux distribution. Armature windings – pole pitch, coil span, winding pitch and commutator pitch. Simplex lap and wave windings, parallel paths, equalizer ring connections, dummy coils – methods of setting brushes in d.c machines. Methods of excitation – separately excited, shunt, series and compound machines. Induced e.m.f – e.m.f. equations. Armature m.m.f. – Magnitude and direction, armature reaction – air gap flux distribution under load conditions, effect of saturation, demagnetizing and cross-magnetizing armature m.m.f. – variation with brush position – compensating winding connections.

Module II

Commutator: Time of commutation, e.m.f. In the coil undergoing commutation, reactance e.m.f. – effect of brush shift, interpoles – polarity and winding connections. Type of d.c. generators – characteristics – open circuit characteristics, condition for self-excitation, critical resistance, critical speed. Load characteristics, effect of compounding. Parallel operation – parallel operation of shunt series and compound generations, equalizer connections.

Module III

DC Motors: Principles of operation, back e.m.f, production of torque, torque equation, developed and shaft torque, performance characteristics of shunt, series and compound motors, applications of various types of DC motors. Starting – need of the starter, face plate starters – three point and four point starters, calculation of resistance elements for shunt meter starter, Speed control – field control, armature control – Ward Leonard speed control. Testing of d.c. machines – losses and efficiency, separation of losses – Swinburne’s test, Hopkinson’s test, Fields Test, retardation test.

Module IV


References:


Bhimbra P.S. - *Electrical Machinery*, Khanna Publishers, New Delhi


Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 404 LINEAR SYSTEMS ANALYSIS

Module I


Module II

Modelling of non-electrical systems: Translational and rotational systems, force voltage and force-current analogy- friction spring inertia-pneumatic hydraulic and thermal systems. Dynamic equations and transfer functions-comparison of different systems.

Module III

Time domain analysis for linear systems: Response to standard inputs, impulse response-step ramp and acceleration inputs-time domain performance measures-under damped and over damped systems, error constants.

Module IV

State space models for linear systems: Concepts, state space, linear systems in state space, state models from transfer functions state transition matrix time response from state model zero state and zero input response concept of stability. BIBO stability, Routh’s Hurwitz criterion. Lyapunov’s stability-asymptotic. Stability theorems applied to linear systems only.

Reference:

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EC/EE 405 ANALOG COMMUNICATION

Module I.


Module II.

Angle Modulation – mathematical analysis, principles, waveforms, frequency deviation, frequency analysis, bandwidth requirement, phasor representation–pre-emphasis, de-emphasis. FM modulators – direct, indirect, Phase modulators – direct. FM transmitters – direct FM, indirect FM; FM receivers-block diagram– decomulators – Tuned circuit frequency discriminators, slope detector, balanced slope detector, Foster-Seeley discriminators, ratio detectors – FM noise suppression; FM stereo broadcasting-stereo transmitter, stereo receiver (block level treatment only).

Module III.


Module IV.

Telephony –Simple telephone communication, classification of switching systems, Basics of a switching system; Switches & Multiplexers, DTMF & Pulse signaling, Electronic switching – stored program control, centralized and distributed SPC, enhanced services, Time division, space division & combination switching, Signaling techniques; Traffic Engineering – Network traffic, load and parameters, grade of service, blocking probability, traffic congestion.

Text Books:

References:
Wayne Tomasi, *Electronic Communications Systems (Fundamentals through Advanced)*, Pearson Education 5th Ed.

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EC/EB/EI/EE/ 406 INDUSTRIAL & POWER ELECTRONICS

Module I.
Power transistors - Design of high power amplifier – switching transistors - Parallel operation of transistor - Power MOSFET - Operating principles - Structure and characteristics. Thyristors – Classification & Constructional Details. SCR - Working principle - turn on, turn off and V - I characteristics - gate characteristics, and rating: Series and parallel operation of SCR - TRIAC - characteristics, modes of operation, Trigger circuits - magnetic & solid state , half- wave and full-wave operation .

Module II.
Single phase controlled rectifiers - half-wave, full-wave, half-controlled and fully controlled - typical waveforms with R, RL, RL with diode and RL with voltage source - voltage and current equation for half-wave controlled rectifier. Three phase half-wave and full-wave controlled rectifier with R load, waveforms. DC motor speed control - various schemes – multi quadrant operation - simple circuits for speed control of series, PM and separately excited motors.

Module III.
Commutation schemes - (different classes) waveforms - single-phase invertors - series, parallel and bridge -PWM inverter - square wave and sin wave output. Chopper circuits using SCR transistor (detailed analysis not required) - Jones Chopper. A.C Motor speed control - various schemes - electronic control of speed of induction motors and synchronous motors.

Module IV.

Text Book:

References:-
1. Power Electronics, IMPACT Learning Material Series, Indian Society for Technical Education.
2. J. Michael Jacob, Power Electronics: Principles & Applications, Thomson Learning, New Delhi,
3. B. K. Bose, Modern Power Electronics And AC Drives, Pearson Education/ Prentice-Hall

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
CS/EB/EI/EC/EE 407 DIGITAL ELECTRONICS LAB

1. Half adder and full adder using NAND gates.
2. Code converters - Binary to Gray and gray to Binary using mode control
3. Binary addition and subtraction (a) 1’s complement (b) 2’s complement (using 7483)
4. BCD adder using 7483.
5. Study of MUX, DeMUX & Decoder Circuits and ICs
6. Set up R-S & JK flip flops using NAND Gates
7. Asynchronous UP / DOWN counter using JK Flip flops
8. Design and realization of sequence generators.
9. Study of shift registers and Implementation of Johnson and Ring counter using it.
10. Study of IC counters 7490, 7492, 7493 and 74192 or the CMOS equivalent.
12. Transfer characteristics and specifications of TTL gates

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.

EE 408 ELECTRICAL MEASUREMENTS LAB

Measurement of resistance using Wheatston’s bridge
Measurement of resistance using Kelvin’s double bridge
Measurement of self and mutual inductance of coupled coils
Measurement of KVAR in 3-phase circuits by single and two wattmeter method.
Calibration of ammeter using slide wire potentiometer
Calibration of Voltmeter using slide wire potentiometer
Measurement of internal resistance of battery using vernier potentiometer
Measurement of resistance of earth electrode using earth megger.
Calibration of wattmeter using vernier potentiometer
Determination of B-H curve
Determination of Hysteresis loop-tracing the loop using CRO
Calibration of single phase energy meter by direct and phantom loading
Calibration of single-phase energy meter at 0.5 & 0.866 p.f. without using phase shifting transformer.
Calibration of 3-phase energy meter.
Adjustments in energy meter using rotating sub-standard.

Student shall present his/her fair record, notebook duly certified by the Head of the Department, to the examiners at the time of University Practical examination.

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.
Module I

**Probability distributions:** random variables (discrete & continuous), probability density, mathematical expectation, mean and variance of a probability distribution, binomial distribution, Poisson approximation to the binomial distribution, uniform distribution, normal distribution.

**Curve fitting:** method of least squares, correlation and regression, lines of regression.

Module II

**Sampling distributions:** population and samples, the sampling distribution of the mean (unknown), the sampling distribution of the mean (σ known), the sampling distribution of the mean (σ unknown), point estimation, interval estimation, tests of hypotheses, null hypotheses and significance tests, hypothesis concerning one mean, type I and type II errors, hypotheses concerning two means. The estimation of variances: Hypotheses concerning one variance - Hypotheses concerning two variances.

Module III

**Finite difference Operators:** \( \nabla, \Delta, E, \delta, \mu, x^n \)

Newton’s Forward and Backward differences, interpolation polynomials, central differences, Stirlings central differences, interpolation polynomial. Lagrange interpolation polynomial, divided differences, Newton’s divided differences, interpolation polynomial.

**Numerical differentiation:** Formulae for derivatives in the case of equally spaced points.

**Numerical integration:** Trapezoidal and Simpson’s rules, compounded rules, errors of interpolation and integration formulae. Gauss quadrature formulae (No derivation for 2 point and 3 point formulae)

Module IV **Numerical solution of ordinary differential equations:** Taylor series method, Euler’s method, modified Euler’s method, Runge-Kutta formulae 4th order formula.

**Numerical solution of boundary value problems:** Methods of finite differences, finite differences methods for solving Laplace’s equation in a rectangular region, finite differences methods for solving the wave equation and heat equation.

Text Books:

References:

Type for questions for University Exams

**Question (1) - Eight short answer question of five marks with two questions from each of four modules**

**Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.**
Module I
Alternators- constructional features of high speed cylindrical rotor and low speed salient pole machines, synchronous speed AC windings - different types (detailed drawing not required) emf equation- distribution factor- coil span factor- field mmf and gap flux density distribution – harmonics in induced emf - remedial measures - mmf of AC windings- space harmonics- revolving magnetic field.

Module II

Module III
Synchronous motor-torque and power relationship-phasor diagram starting of synchronous motors-losses and efficiency calculations-V curves-synchronous condenser-load angle

Module IV
Power angle diagrams -power flow equation for cylindrical and salient pole machines-reluctance power-maximum power transfer-stability limit-control of active and reactive power in synchronous machines on infinite bus bars. Symmetrical short circuits (only qualitative analysis) - steady state, transient and subtransient reactance - time constants- Hunting in synchronous machines- natural frequency of oscillations - damper windings.

Text Book:
2. Bimbra P.S. : Electrical Machinery, Khanna Publications

References:
1) Say M.G ELBS & Pitman : Performance and design of AC Machines,
2) Langsdorf A.S : Theory of AC machines, Tata McGraw Hill

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 503 FIELD THEORY

Module I
Static Electric field: Coulomb’s law, superposition, electric flux, electric field, electric scalar potential, dipole, method of images – Gauss law for electric flux, boundary conditions – capacitance of isolated sphere, concentric sphere, co-axial cylinder/cable two wire transmission line- energy stored in electric field / capacitor, energy density. Laplace equation, Poisson’s equation, Uniqueness theorem.

Module II

Module III

Module IV

Text Book

Reference

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 504 ELECTRICAL MATERIAL SCIENCE

Module I
Conducting materials: Review of metallic conduction on the basis of free electron theory-
Fermi-Dirac distribution – variation of conductivity with temperature and composition,
Materials for electric resistances- general electric properties: brushes of electrical
machines, lamp filaments, fuses and solder.
Semiconductors: Compound semiconductors – basic ideas of amorphous and organic
semiconductor – preparation of semiconductor materials – zone-refining technique –
fabrication of p-n-p junction.
Magnetic materials: Classification of magnetic materials – origin of permanent magnetic
dipoles – ferromagnetism - hysterisis curve – hard and soft magnetic materials –
magnetic material used in electrical machines, instruments and relays.

Module II
Dielectrics: dielectric polarization under static fields – electronic, ionic and dipolar
polarizations – behavior of dielectrics in alternating fields – mechanism of breakdown in
gases, liquids and solids - factors influencing dielectric strength – capacitor materials
Insulating materials – complex dielectric constant – dipolar relaxation dielectric loss
insulator materials used – inorganic materials (mica, glass, porcelain, asbestos) – organic
materials (paper, rubber, cotton silk, fibre, wood, plastics, bakelite)- resins and varnishes
– liquid insulators (transformer oil) – gaseous insulators (air, SF6, and hydrogen ) –
ageing of insulators.

Module III
Materials for special applications: materials for solar cells/fuels cells/battery- materials
for coatings for enhanced solar thermal energy collection – solar selective coatings- cold
mirror coatings- heat mirror coatings – antireflection coatings, Sintered alloys for
breaker/switch contacts – arcing tips.

Module IV
Modern techniques for Material Studies: optical microscopy – electron microscopy –
photoelectron spectroscopy – atomic absorption spectroscopy – magnetic resonance –
nuclear magnetic resonance – electron spin resonance – ferromagnetic resonance.

Text Book
1.Indulkar C.S. & Thirivengadam S- An Introduction to Electrical Engineering

Reference:
Wesley Publications.
Publications.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of
four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to
answer either A or B.
EE 505 MICROPROCESSOR BASED SYSTEMS

Module I

Intel 8085 and 8086 processors – architecture – memory addressing – addressing modes –
instruction set – assembly language programming – assemblers – interrupts – pin
configuration - timing diagrams – minimum and maximum mode – multiprocessor
configuration.

Module II

Interfacing – address decoding – interfacing chips – programmable peripheral interface
(8255) – programmable communication interface (8251) – programmable timer (8253) –
DMA controller (8259) – programmable interrupt controller (8257) – keyboard display
interface (8279).

Module III

Introduction to 80386 – memory management unit – descriptors, selectors, description
tables and TSS – real and protected mode – memory paging – special features of the
Pentium processor – branch prediction logic – super scalar architecture.

Module IV

8051 Micro controller – Architecture Basic Assembly Language Programming Concepts
– Moving data – Logical Operations- Arithmetic Operations – Jump and call Instructions-
/ An 8051 Micro controller Design- Applications- Serial data Communication.

Text Books


Reference

1. Brey B.B. - The Intel Microprocessors – Architecture, Programming &
Interfacing, Prentice Hall.
Hall of India.
3. Uffenbeck J.E - The 8086/8088 Family: Design, Programming & Interfacing,
Prentice Hall of India (P) Ltd.
McGraw Hill.

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of
four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to
answer either A or B.
EE506 LINEAR INTEGRATED CIRCUITS

MODULE I

MODULE II

MODULE III

MODULE IV

REFERENCE:
1. Op amps and Linear Integrated circuits : RF Coughlin – Pearson Education /PHI
3. Linear Integrated Circuits : d roy Chaudary , Shail B Jain
4. Integrated circuits : K.R Botkar

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 507 ELECTRICAL MACHINES I LAB

Plotting of the open circuit characteristics of the given d.c. shunt generator at rated speed.
Pre-determination of o.c.c. at other speeds and critical resistances of various speeds.
Finding the voltage built-up with a given field circuit resistance and the critical speed for a
given field circuit resistance.
Load test on the given DC shunt generator and plotting external characteristics – Deduce
the internal characteristics and armature reaction curve.
Brake test on DC shunt and series motor and plot the following characteristics:
  Output Vs Efficiency
  Output Vs Line current
  Output Vs Speed
  Speed Vs Torque
  Line current Vs Torque
  a) Study of 3 point and 4 point starters for DC shunt motor
  b) Swinburne’s test on DC shunt machine and pre-determination of armature current
     and percentage efficiency when the machine operates as a motor and as a
     generator delivering ¼, ½, ¾, full and 5/4\(^{th}\) rated output.
Hopkinson’s Test on a pair of DC Machines and pre-determining of the efficiency of the
machine working as motor and as a generator under various conditions of load on the
generator.
Separation of losses in a d.c. machine by conducting a retardation test and determination
of the moment of inertia of the rotating system.
Separation of losses in d.c. shunt machine by conducting no load test at different
excitations and plotting the variations of these losses at various speeds.

Transformers
  a) Polarity test on single phase transformers.
  b) Connect three single phase transformers to form a 3 phase transformer with YY
     and DYI connection. Perform the load test, under balanced upf conditions – Plot
     the efficiency Vs output and % regulation Vs output characteristics.
O.C and S.C test on the single phase transformer and Pre-determination of the following:
Efficiency at various loads and power factors.
Regulation at various loads and lagging and leading power factors.
Equivalent circuits referred to H.V and L.V sides.
Calculation of performance using equivalent circuit and given load connection to the
  equivalent circuit.
Upf load at which efficiency is maximum.
Separation of losses of single phase transformer into hysteresis and eddy current loss components at
normal voltage and frequency.
Sumpner’s test on a pair of identical single phase transformers and pre-determination of the
efficiency and regulations at various loads and power factor.
Scott connection of the single phase transformers and the performance under various load
conditions at Upf and plotting the efficiency curves with
Main transformer secondary alone loaded.
Teaser transformer secondary alone loaded.
Balanced loading.
Unbalanced loading.
Student shall present his/her fair record, notebook duly certified by the Head of the Department, to
the examiners at the time of University practical examination.

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester
examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% 
marks for two components to be eligible for pass in that subject.
EE 508 POWER ELECTRONICS LAB

Part A - Power Electronics
Study of Power devices – power BJT, SCR, power MOSFET, IGBT etc.
Characteristics of SCR and Triac
Characteristics of power MOSFET
Triggering circuits for SCRs – R, RC and UJT triggering
Single phase fully controlled SCR bridge circuit – R load, RL load – effect of free
wheeling diode.
Triggering circuits for SCR chopper
Triac triggering
Speed control DC motor using SCR
Study of V/F control of induction motor.
AC controller using Triac
Study of UPS/SMPS

Part B - Op-Amps

Study of Op-Amps
Op-Amp inverter – scale changer – summer – integrator – differentiator – comparator and
instrumentation amplifier

Design and setup of low pass – high pass and band pass filters using Op-Amps
Voltage Regulation using 723
PLL measurement of lock range and capture range
Circuits using Op-Amps for wave form generation
Astable, monostable multivibrators
Wein Bridge Oscillator
Triangular and square wave form generation
Precision rectifiers
Schmitt trigger using Op-Amps

According to the facility available in the laboratory any 15 experiments can be conducted.

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end
semester examination, to be assessed by two examiners. A candidate shall secure a
minimum of 50% marks for two components to be eligible for pass in that subject.
EE 601 POWER SYSTEMS – I

Module I
Conventional sources of electrical energy- thermal, hydroelectric, diesel and nuclear power plants-introduction to renewable energy sources- power plant economics – operating costs- load factor- demand factor- diversity factor- plant factor. Types of tariffs, power factor improvement.

Module II
Overhead transmission systems- arrangement of conductors- sag and tension-transmission line supports and their location, economic span- choice of transmission voltage- line insulators- string efficiency- impulse ratio- arcing horns and rings- failure of insulation- corona- under ground cables- different types- capacitance of single core and three core cables- grading of cables.

Module III

Module IV
Performance of transmission lines- calculation of transmission line inductance and capacitance- GMD and GMR- bundled conductors- transposition- ABCD constants- effect of capacitance- nominal T and π methods of calculations- power flow through a transmission line. Methods of voltage control.

Reference:

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
CS/EE 602 DIGITAL SIGNAL PROCESSING

Module 1
Introduction to signals & systems- Discrete time signals and systems- Properties of discrete systems-linearity,time invariance-causality-stability.convolution.difference equation representation of discrete systems -The Z transform-properties of Z transform- the inverse z transform-System Transfer function.

Module 2

Module 3
IIR Digital Filters : - Transfer function. Difference equation representation. Recursive Realizations Direct form I , Direct form II –Cascade Realization-Parallel realization – Comparison of IIR & FIR filters in terms of computational complexity, memory requirement, hardware complexity, stability .

Module 4
Finite word length effects in digital filters- fixed point arithmetic -Floating point arithmetic- Block floating point arithmetic - Truncation-Rounding - Quantization error in analog to digital conversion-Limit cycles. General DSP architecture- features _ On chip subsystems- memory organization-Addressing modes- Instruction types - TMS320C54X fixed point processor- TMS320C4X floating point processor
Applications of DSP

References:
Cristi, Modern Digital Signal Processing, Ed. 1.
Avatar Singh, Digital Signal Processing Implementations, Edition 1
Oppenheim & Ronald W Schafer : "Digital Signal Processing", Prentice Hall India

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 603 CONTROL SYSTEMS I

Module I
Frequency domain analysis, sinusoidal frequency response. Polar plots and logarithmic plots – Bode plots – Nyquist plots – absolute stability and relative stability from Bode and Nyquist plots.

Module II
Basic theory and properties of Root loci produce for construction of root loci, complete RL diagram.
Control system components: synchros, d.c servomotor, a.c servomotor, stepper motor, tacho generator.

Module III

Module IV

Reference:
A.Nagoorkani “Control Systems”, RBA Publication

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 604 ELECTRICAL DRAWING

Module I
D.C. Armature windings - Simplex lap and wave windings.
Sectional front and side elevation of the armature with commutator.
Sectional front and side elevation of the yoke and pole assembly with field winding.
Sectional front and side elevation of an assembled dc machine.

Module II
Transformers
Sectional plan and elevation of core type and shell type single-phase transformer.
Sectional plan and elevation of a three-phase transformer.
Induction Motors
Sectional front and side elevation of slip ring and squirrel cage induction motor.
Alternators
Sectional front and side elevation of salient pole and turbo alternators.

Module III
Three-phase AC windings
Single layer windings - Mush windings and concentric windings.
Double layer lap windings - Full pitched, short pitched and fractional slot windings.
Double layer lap windings.

Module IV
Single line layout of substations.
Single line layout of generating stations.
Single circuit and double circuit transmission towers.

Reference:
S.K Battacharya - Electrical Engineering Drawing.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 605 MODERN COMMUNICATION ENGINEERING

Module I


Module II


Module III


Fiber optic communication: light wave communication systems- Fiber optic cable - optical transmitter and receiver.

Module IV


References:
1) Electronic Communications : Dennis Roddy and John Coolen, Prentice Hall, India.
   For Modules IV & V
4) Communication Electronics : Frenzel MGH

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B
EE 606 ELECTRICAL MACHINES III

Module I
Three phase induction motor - constructional details - slip ring and squirrel cage types-
Theory of the induction machine with constant mutual flux - slip phasor diagram -
mechanical power and developed torque - Torque slip curves - variation and starting torque
with rotor resistance- pull out torque - losses and efficiency - approximate and exact
equivalent circuits - circle diagram - No load and blocked rotor tests - performance
calculations from the equivalent circuit.

Module II
Starting - starting squirrel cage motors- direct on-line starting auto transformer and star -
delta starter - starting current and torque - starting of slip ring motors - design of rotor
rheostat.
Effects of harmonics - Harmonic induction and harmonic synchronous torques - cogging,
crawling and noise production - methods of elimination - special rotor construction - Deep
bar, composite bar and Boucherot rotor constructions - equivalent circuits and torque
curves of double cage motors.

Module III
Methods of speed control - pole changing methods - rotor rheostatic control - change of
supply frequency - use of SCR for speed control - principle of speed regulation and
improvement of power factor by rotor injected emf.
Induction generator Theory - phasor diagram - circle diagram - equivalent circuit -
applications.
Synchronous induction motor- construction - rotor winding connections - circle diagram -
pulling into step.

Module IV
Single phase induction motor - revolving field theory equivalent circuit - torque slip curve-
starting methods - split phase, capacitor start, capacitor run motors shaded pole motor -
repulsion start and repulsion induction motor.
Commutator motors - General, principles and theory - commutator as a frequency converter
- emf induced in a commutator winding - single phase series motor - theory - phasor and
circle diagram - compensating and interpole windings - universal motor - principle of
repulsion motor - torque production - phasor diagram - compensated type of motors
repulsion start induction motor - applications.
Poly phase commutator motors - Three phase series and shunt type - schrage motor -
characteristics and applications

References:
1) Performance & Design of AC Machines : Say MG
2) Theory of AC Machinery : Langsdorff AC
3) AC Commutator Motors : Openshaw Taylor
4) Alternating Current Machines : Puchstein & Lloyd
5) Electrical Machines Part I & II : Kostenko & Pietrovsky

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of
four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to
answer either A or B.
EE 607 MICROPROCESSOR LAB

Part A (Compulsory)

Study of a typical microprocessor trainer kit and its operation

Simple programming examples using 8085 instruction set. To understand the use of various instructions and addressing modes – monitor routines.

- Interfacing and programming of 8255 (eg: traffic light control, Burglar alarm, stopwatch)
- Interfacing and programming of 8253/8254
- Interfacing and programming of 8279.

Part B

- A/D and D/A converter interface
- Stepper motor interface
- Display interface

Programming of different types of EPROM 2716, 2732, etc…(at least two topics from Part B has to be covered.)

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.

EE 608 MINI PROJECT

Each batch comprising of 3 to 5 students shall design, develop and realize an electronic product. Basic elements of product design must be considered. Fully software/simulation projects are not allowed. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation including the Bill of Materials and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations and aesthetics/ergonomic aspects taken care of in the project shall be given due weight.

Guidelines for evaluation:

i) Attendance and Regularity 10
ii) Work knowledge and Involvement 30
iii) End-Semester presentation & Oral examination 20
iv) Level of completion and demonstration of functionality/specifications 25
v) Project Report 15

Total 100 marks

Note: External projects and R&D projects need not be encouraged at this level. Points (i) & (ii) to be evaluated by the project guide & co-ordinator and the rest by the final evaluation team comprising of 3 teachers including the project guide
Module 1
Organisation: Introduction, definition of organization, system approach applied to organization, necessity of organization, elements of organization, process of organization, principles of organization, formal and informal organization, organization structure, types of organization structure.
Forms of business organization: Concept of ownership organization, types of ownership. Individual ownership, partnership, joint stock Company, private and public limited company, co-operative organizations, state ownership, public corporation

Module 2
Basic concept of management: Introduction, definitions of management, characteristics of management, levels of management, management skills
Management theory: Scientific management, contribution of Gilbreth. Gantt, Neo-classical theory, modern management theories
Functions of management: Planning, forecasting, organizing, staffing, directing, motivating, controlling, co-coordinating, communicating, decision making.

Module 3
Personnel management: Introduction, definition, objectives, characteristics, functions, principles and organization of personnel management
Markets and marketing: Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behaviour and advertisement.
Financial management: the basics, financial accounts, inflation, profitability, budgets and controls, cost accounting, valuation of stock, allocation of overheads, standard costing, marginal costing

Module 4
Productivity and production: Measurement of productivity, productivity index productivity improvement procedure
Materials management and purchasing: Objectives, functions, importance of materials management. Stores and storekeeping
Inventory control: Classification, functions, inventory models, inventory costs, EOQ, Materials requirement planning

References:
Fraidoon Mazda, Engineering Management-, Addison -Wesley
Kotlar P, Marketing Management, Prentice Hall India
Chandra P, Finance Management
Monks J.G Operations Management

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module I

Module II
Design of illumination schemes – various types of light sources – different types of lighting arrangement – energy efficiency in lamps and illumination – design considerations of good lighting schemes – design of lighting schemes for various purposes – lighting calculations – design of flood lighting and street lighting – electrical aspects and considerations for lifts, escalator services and standby generators – design and safety aspects of electrical installations for residential buildings, hospitals, hotels, recreational and assembly buildings and cinema theatre.

Module III
Electrical installations of high rise buildings – design – schematic diagram – layout – estimation and testing of rising main – main supply board and distribution boards for high rise buildings including air conditioners and lift with provision for standby generators and its protection – lighting protection – electrical system design – estimation and costing of commercial buildings – design considerations of electrical installations in Industries – design, estimating and costing of electrical installations for small industries.

Module IV
Selection of EHV and HV power and distribution transformers and switchgears – case studies – design – layout – schematic diagram – estimation and costing – (a) 16MVA – 110/11KV outdoor substation having one or two incoming and 8 or less outgoing – (b) 11KV/415V outdoor substations upto 630KVA – (c) 11KV/415V indoor substation upto 630KVA – (d) bus bar trunking above 630KVA – design of earthing system – earthmat design – design of plate and pipe earthing – shielding of electrical system.

Reference books
Raina & Battacharya, Electrical System Design, Estimation & costing, Wiley Eastern
Gupta J.B, Electrical Installing, Estimating & Costing, Kataria & Sons
ISI, National Electric Code, Bureau of Indian Standard Publications
Cinema Regulation (Rules) & Act
IEEE Standards, IEEE
Relevant Indian Standard Specifications, IS Publications.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 703 POWER SYSTEMS-II

Module I

Module II

Module III

Module IV

Text Book:
Stevenson W.D Jr - Elements of Power System Analysis (TMH)
IJ Nagrath & D.P Kothari - Modern Power System Analysis, (TMH)

Reference:
2. S.S Rao - Switch gear & Protection (Khanna Publication)

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 704 CONTROL SYSTEMS II

Module I

Module II

Module III
Discrete time systems, sampling theorem, hold circuits and data reconstruction- z transforms, inverse z transforms, pulse transfer- state variables description of discrete time systems- time domain analysis, stability using Jury’s test and Lyapunov’s method.

Module IV
Elements of stochastic control- stochastic processes- autocorrelation and cross correlation, power spectral density, ergodicity – Gauss, Markov processes- Wiener filter, introduction to Kalman filter and state estimation.

Reference Book

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EB/EE 705(A) COMPUTER COMMUNICATIONS

Module 1

Module 2

Module 3
Network Layer: Virtual circuits and data grams – Datagram and Virtual circuit service- Routing - different types of congestion control – IP protocol – Subnets – Multicasting - Network layer in ATM.
Transport layer – Transport layer services - design issues – Elements of transport Layer – Internet Transport Protocols (TCP and UDP).

Module 4
Session layer - design issue - data exchange – dialogue management - synchronisation - remote procedure call - client server model.
Application layer - network security and privacy - cryptography – Domain Name System (DNS)- SMTP – SNMP - virtual terminal and file transfer protocols - electronic mail - WWW and HTTP.

References:
Zheng, S Akhtar, Networks for computer scientists and Engineers, Oxford Press, 2004
Uyless Black, Computer Networks - Protocols, Standards and Interfaces, PHI Ltd., 1994
Stalling , Local and Metropolitan Area Networks Prentice Hall; 6th edition (April 15, 2000)

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 705(B) HIGH VOLTAGE DC TRANSMISSION

Module I


Module II


Module III


Module IV

Smoothing reactors – DC lines – DC line insulators – DC breakers – basic concept, characteristics, types and applications. Sources of reactive power- static VAR systems- Thyristor controlled reactor – Types of AC filters (Basic concept only)- DC filters – Carrier frequency and RI noise. Multiterminal DC system – Potential. Application and type. Modeling of DC network.

Simulation of HVDC system – system simulation – philosophy and tools only.

Text Books:
2. C.L Wadhawa – “HVDC Power Transmission “

References:
2. E.Uhaman, “Power Transmission by Direct Current” (Berlin) Spinger – Verlag
EE 705(C) NEURAL NETWORK AND FUZZY LOGIC

Module I
Introduction to artificial neural networks – biological neurons – Mc Culloch and Pitts
modals of neuron – types of activation function – network architectures – knowledge
representation learning process – error-correction learning – supervised learning –
unsupervised learning – single unit mappings and the perceptron – perceptron
convergence theorem (with out proof) – method of steepest descent – least mean square
algorithms – adaline/medaline units – multilayer perceptrons – derivation of the back-
propagation algorithm.

Module II
Radial basis and recurrent neutral networks – RBF network structure – covers
theorem and the separability of patterns – RBF learning strategies – K-means and LMS
algorithms – comparison of RBF and MLP networks – recurrent networks – Hopfield
networks – energy function spurious states – error performance – simulated annealing –
the Boltzaman machine – Boltzman learning rule – the mean field theory machine – MFT
learning algorithm – applications of neutral network – the XOR problem - traveling
salesman problem – image compression using MLPs – character retrieval using
Hopfield networks.

Module III
Fuzzy logic – fuzzy sets – properties – operations on fuzzy sets – fuzzy relations –
operations on fuzzy relations – the extension principle – fuzzy measures – membership
functions – fuzzification and defuzzification methods – fuzzy controllers – Mumdani and
Sugeno types – design parameters – choice of membership functions – fuzzification and
defuzzification methods – applications.

Module IV
Introduction to genetic algorithm and hybrid systems – genetic algorithms – natural
– cross over and mutation operators basic GA and structure.

Introduction to Hybrid systems – concept of neuro-fuzzy and neuro-genetic systems.

Reference:
1) Haykins S - “Neutral Network a – Comprehensive Foundation”, Macmillan
College, Proc, Con, Inc.
Control”, Norosa.
5) Goldberg D.E - “Genetic Algorithms in Search Optimisation and Machine
Learning”, Addison Wesley.
Englewood Cliffs.
7) Suran Goonatilake & Sukhdev Khebbal (Eds) - “Intelligent Hybrid Systems”,
JohnWiley.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of
four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to
answer either A or B.
EE 705 (D) OPTIMAL CONTROL THEORY

Module I
Introduction, optimal control problem, formulation, performance measures for optimal control problems.

Module II
Calculus of variations- fundamental concepts, functional of single function, Euler-language equation. Transversality conditions, vector case with various boundary conditions, Piecewise, smooth extremals, constrained extremisation of functional.

Module III
Variational approach to optimal control problems. Necessary conditions for optimal control with different boundary conditions. Linear regulator problem, Tracking problems, pontryagin minimum principle, state in equality constrains, minimum time problems, minimum control effort problems.

Module IV
Dynamic programming, principle of optimality, application to multistage decision making, optimal control example, Recurrence relation of dynamic programming, curse of dimensionality, discrete linear regulator problem, Heamilton-Jacobi Bellman equation, continuous linear regulator problems.

Reference:

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 706 ELECTRICAL MACHINES LABORATORY II

Synchronous Machines
Regulation of alternator by direct loading
Regulation of alternator by emf and mmf methods.
Regulation of alternator by potier and ASA methods
Slip test and regulation of salient pole alternator using two - reaction theory
Synchronizing of alternator to mains by dark lamp & bright lamp method and control of
reactive power.

Induction machines
Variation of starting torque with rotor resistance in slip ring induction motor.
Direct load test on induction motor.
Pre determination of Characteristic and equivalent circuit of induction motor from no load
and blocked rotor test.
Synchronous induction motor V- curves, pre determination of field current.
Pre determination of characteristic of pole changing motor
Test on Induction generator. Determination of rotor hysteresis.

Special experiments
V/f control of induction motor.
Characteristic of single-phase induction motor.
Complete torque slip characteristic of induction motor.
Characteristic of double cage induction motor.
Slip power recovery schemes:
Cascade operation of induction motor. Determination of slip and load shared by each
motor and overall efficiency of the test.
Methods using converter/inverter operations
From the above list, maximum number of experiments may be conducted subject to
facility available.

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end
semester examination, to be assessed by two examiners. A candidate shall secure a
minimum of 50% marks for two components to be eligible for pass in that subject.
EE 707 ADVANCED ELECTRICAL ENGINEERING LAB

MATLAB – I – experiments using MATLAB toolbox.
Determination of transfer function of DC motor (a) armature control (b) field control.
Study and experiments on (a) DC servo motor (b) AC servomotor.
Experiments on synchros (a) characteristics (b) data transmission (c) error detection (d) differential synchro.
Determination of transfer function of the amplidyne and load characteristics.
Design and experimental determination of frequency response determination of lag, lead and lag-lead networks.
Magnetic amplifier – characteristics and control circuits.
Static and dynamic performance evaluation of transducer (a) resistance thermometer (b) vibration pick up (c) pH meter.
Study and performance evaluation of transducers (a) strain gauge (b) inductive pick up (c) capacitive pick up (d) LVDT.
Study and experiments on pneumatic control system.
Microprocessor based generation of non-linear functions using proper interfacing and display devices.
PSPICE simulation of single-phase and three-phase diode bridge rectifiers.
PSPICE simulation of three-phase thyristor bridge rectifier.
Power flow analysis of the system with the given single line diagram, using the given power flow analysis package.
Fault analysis of the system with given single line diagram, using the given fault analysis package. Obtain the sub-transient fault currents for DLFG, DLFG, LLF faults at each bus.
Determination of relay characteristics.

Note: 50% Mark is earmarked for continuous evaluation and 50% mark for end semester examination, to be assessed by two examiners. A candidate shall secure a minimum of 50% marks for two components to be eligible for pass in that subject.

EE 708 SEMINAR

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Electronics & Communication Engineering. The reference shall include standard journals, conference proceedings, reputed magazines and textbooks, technical reports and URLs. The references shall be incorporated in the report following IEEE standards reflecting the state-of-the-art in the topic selected. Each student shall present a seminar for about 30 minutes duration on the selected topic. The report and presentation shall be evaluated by a team of internal experts comprising of 3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.
EE 709 PROJECT DESIGN

Each batch comprising of 3 to 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the following.

- Application and feasibility of the project
- Complete and detailed design specifications.
- Block level design documentation
- Detailed design documentation including circuit diagrams and algorithms / circuits
- Bill of materials in standard format and cost model, if applicable
- Project implementation action plan using standard presentation tools

**Guidelines for evaluation:**

i) Attendance and Regularity 10
ii) Quality and adequacy of design documentation 10
iii) Concepts and completeness of design 10
iv) Theoretical knowledge and individual involvement 10
v) Quality and contents of project synopsis 10

Total 50 Marks

**Note:** Points (i)-(iii) to be evaluated by the respective project guides and project coordinator based on continuous evaluation. (iv)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.
Module I
**D C Machines:** Output equation – main dimensions choice of specific electro magnetic loadings – choice of speed and number of poles. Design of armature conductors, slots and windings – design of airgap, field system, commutator, interpoles, compensating winding and brushes – Carter’s co-efficient – real and apparent flux density. Design examples.

Module II
**Transformers:** Single phase and Three phase transformers – output equation – main dimensions – specific electric and magnetic loadings – design of core, LV winding, HV winding – cooling of transformers – design of cooling tank and tubes. Temperature rise time curve – short time and continuous rating.

Module III
**Alternators:** Salient pole and turbo alternators – output equation – main dimensions – choice of specific electric and magnetic loadings – choice of speed and number of poles – design of armature conductors, slots and winding – design of air-gap, field system and damper winding – prediction of open circuit characteristics and regulation of the alternator based on design data – design examples.

Module IV
**Induction machines:** Output equation – main dimensions – choice of specific electric and magnetic loadings – design of stator and rotor windings, stator and rotor slots and air-gap of slip ring and squirrel cage motors – calculation of rotor bar and end ring currents in cage rotor – calculation of equivalent circuit parameters and prediction of magnetising current based on design data – design examples.

**Reference:**
Clayton & Hancock - *Performance and Design of DC Machines, ELBS.*
Say M.G - *Performance and Design of AC Machines,* Pitman, ELBS.

**Type for questions for University Exams**
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module I

Module II

Module III

Module IV

Reference:
Rao S.S - Switch Gear protections, Khanna.
Haydt G.T - Electric Power Quality, Stars in circle publications.
Kazibwe W.E & Sendula M.H.- Electric Power Quality.

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module I


Module II

Signal conditioning – instrumentation amplifiers – differential amplifiers – filters – law and high pass, band pass and band rejection filters –transducer bridges – null type and deflection bridges – AC bridges using push pull transducers – general telemetry systems – sampling process – principles of time division and frequency division multiplexing, different types of modulation techniques as applied to telemetry (general idea)

Module III

Instrumentations systems – basic measuring systems – analog and digital data acquisition systems – generalized input-output configuration of measuring systems – dynamic characteristics.

Module IV


Text Book

3. Albert D. Helfric & William D. Cooper - Modern Electronic Instrumentation & Measurements Techniques (Prentice Hall)
4. Dr. S. Renganathan - Transducers Engineering ( Allied Publishers Ltd. Delhi

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module I

**Digital image fundamentals:** representation - elements of visual perception - simple image formation model - Image sampling and quantization - basic relationships between pixels – imaging geometry.

**Review of matrix theory results:** Row and column ordering - Toeplitz, Circulant and Block matrices. Review of Image transforms: 2D-DFT, FFT, Walsh, Hadamard, Haar, DCT and Wavelet transforms.

Module II

**Image enhancement:** Spatial domain methods: point processing - intensity transformations, histogram processing, image subtraction, image averaging; Spatial filtering- smoothing filters, sharpening filters. Frequency domain methods: low pass filtering, high pass filtering, homomorphic filtering. Generation of spatial masks from frequency domain specifications.

**Image segmentation:** Detection of discontinuities - point, line and edge and combined detection , Edge linking and boundary description - local and global processing using Hough transform – Thresholding - Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging - Use of motion in segmentation. Fundamentals of Representation and Description.

Module III

**Image restoration:** Degradation model - Diagonalization of circulant and Block circulant matrices - Algebraic approaches - Inverse filtering - Wiener filter - Constrained Least squares restoration - Interactive restoration - Geometric transformations.

**Fundamentals of Colour image processing:** colour models - RGB, CMY, YIQ, HIS - Pseudo color image processing - intensity slicing, gray level to color transformation.

Module IV


Text Book:


References:

EE 804 (B) RENEWABLE SOURCES OF ENERGY

Module I

Module II

Module III
Wind energy – wind turbines – Horizontal axis and vertical axis with turbines – Power and energy from wind turbines – wind characteristics. Energy from oceans: wave energy – Physical principles – wave characteristics and wave power – wave energy technology. – fixed devices – floating devices

Module IV

References:
Renewable energy sources – John W, Twidell & Antony D. Wier – ELBS Publication

Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
Module 1
FACTS concepts and general system considerations: Power flow in AC systems -
Definition of FACTS - Power flow control -Constraints of maximum transmission line
loading - Benefits of FACTS Transmission line compensation - Uncompensated line -
shunt compensation - Series compensation -Phase angle control.

Module 2
Static shunt compensators: SVC and STATCOM - Operation and control of TSC, TCR
and STATCOM - Compensator control - Comparison between SVC and STATCOM.
Static series compensation: TSSC, SSSC -Static voltage and phase angle regulators -
TCVR and TCPAR- Operation and Control -Applications.

Module 3
Unified Power Flow Controller: Circuit Arrangement, Operation and control of UPFC-
Basic Principle of P and Q control- independent real and reactive power flow control-
Applications - Introduction to interline power flow controller.

Module 4
Special purpose FACTS controllers - Thyristor controlled voltage limiter - Thyristor
controlled voltage regulator - Thyristor controlled braking resistor - Thyristor controlled
current limiter-
Custom Power - Compensation Devices - STS - SSC - SVR -Backup energy supply devices

Reference Books:
1. N.G. Hingorani, L. Gyugyi, “Understanding FACTS: Concepts and Technology of
   Distributors, Delhi, 2001.

2. R. Sreeram Kumar (Ed) “Lecture Notes on Flexible AC Transmission Systems
   (FACTS)”. Institution of Engineers (India), Calicut Local Centre, 2003.

   Nalanda Digital Library, NIT Calicut,2003


Type for questions for University Exams
Question (1) - Eight short answer question of five marks with two questions from each of
four modules
Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer
either A or B.
Module I.

**VLSI process integration**: fundamental considerations in IC processing - NMOS and PMOS IC technology - CMOS IC technology - BiCMOS IC technology - GaAs technology. Ion implantation in IC fabrication. The MOS device - (n-channel & p-channel) - capacitance of MOS structure - accumulation, depletion and inversion, threshold voltage, current equations - characteristics, channel pinch-off. Second order MOS device effects: short-channel effect, narrow width effect, sub-threshold current, device saturation characteristics.

Module II.

Switch logic- pass transistors and transmission gates, Gate logic-The basic inverter using NMOS-circuit - current equations - pull up to pull down ratio- transfer characteristics- Alternate forms of pull up. Basic NAND, NOR circuits. The CMOS inverter, characteristics – NAND, NOR and compound circuits using CMOS. Other forms of CMOS logic: pseudo CMOS, CMOS domino logic, n-p logic. Layout design of static MOS circuits – Layout rules - general principles & steps of lay-out design - use of stick diagrams - design rules - Layout examples of NAND and NOR.

Module III.

Basic circuit concepts: sheet resistance, area capacitance, delay unit, inverter delays - driving large capacitive loads, cascaded inverters, super buffers, BiCMOS drivers. Combinational circuits - clocked sequential circuit - drivers for bus lines. Scaling of MOS circuits: scaling models and scaling factors for device parameters.

Module IV.

**Timing issues in VLSI system design**: timing classification- synchronous timing basics - skew and jitter- latch based clocking- self timed circuit design - self timed logic, completion signal generation, self timed signaling–synchronizers and arbiters.

**Text Books**

Douglas A Pucknell, Kamran Eshraghian , *Basic VLSI Design*, P HI
Jan M. Rabaey, A. Chandrakasan, B. Nikolic *Digital Integrated Circuits- A Design perspective* 2/e, Pearson education

**References**

S M Sze, *VLSI Technology, PHI*
Mead & Conway , *Introduction to VLSI System Design*-Addison Wesley
Fabricius, *Introduction to VLSI Design*,Pearson

Type for questions for University Exams

Question (1) - Eight short answer question of five marks with two questions from each of four modules

Question (2-5) - Two questions A & B of 15 Marks from each module with options to answer either A or B.
EE 805 PROJECT WORK

Each batch of students shall develop the project designed during the VII semester. The implementation phase shall proceed as follows:

For hardware projects, practical verification of the design, PCB design, fabrication, design analysis and testing shall be done.
For software projects, a proper front end (GUI) if applicable, shall be designed. A detailed algorithm level implementation, test data selection, validation, analysis of outputs and necessary trial run shall be done.
Integration of hardware and software, if applicable, shall be carried out.
A detailed project report in the prescribed format shall be submitted at the end of the semester. All test results and relevant design and engineering documentation shall be included in the report.
The work shall be reviewed and evaluated periodically

The final evaluation of the project shall be done by a team of minimum 3 internal examiners including the project guide and shall include the following.

Presentation of the work
Oral examination
Demonstration of the project against design specifications
Quality and content of the project report

Guidelines for evaluation:
Regularity and progress of work 30
Work knowledge and Involvement 100
End semester presentation and oral examination 50
Level of completion and demonstration of functionality/specifications 70
Project Report – Presentation style and content 50

Total 300 marks

Note: Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation. (iii)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

EE 806 VIVA-VOCE

Each student is required to appear for a viva-voce examination at the end of the complete course work. The students shall produce the seminar report and project reports duly attested by the institutional authorities, before the examiners. The examination panel shall comprise of one internal examiner and one external examiner, both appointed by the University. The examiners shall evaluate the students in terms of their conceptual grasp of the course of study and practical/analysis skills in the field.