Scheme for I to VIII

B.TECH ELECTRONICS & COMMUNICATION ENGINEERING

(2006 Admission onwards)

Semester I & II

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/ EI/IT/ME/SE **101**	Engineering Mathematics I	3		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **102**	Engineering Physics	2		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **103**	Engineering Chemistry	2		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **104**	Engineering Mechanics	3	1	50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **105**	Engineering Graphics	1	3	50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **106**	Basic Civil & Mechanical Engineering	2		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **107**	Basic Electrical & Electronics Engineering	2		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **108**	Computer Programming	2		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **109**	Technical Communication & Social Sciences	3		50	100	150
CE/CS/EB/EC/EE/ EI/IT/ME/SE **110**	Computer Programming Laboratory		3	100		100
CE/CS/EB/EC/EE/ EI/IT/ME/SE **111**	Electrical & Mechanical Workshops		3	100		100
	Total	**20**	**10**	**650**	**900**	**1550**

Semester III

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/ EI/IT/ME/SE **301**	Engineering Mathematics II	4		50	100	150
EB/EC/EI/IT/ ME **302**	Electrical Technology	4		50	100	150
EC/EI **303**	Network Theory	4		50	100	150
EB/EC/EI **304**	Digital Electronics	4		50	100	150
EC/EI **305**	Solid State Electronics	4		50	100	150
EC/EI **306**	Electronic Circuits I	4		50	100	150
EB/EC/EI **307**	Basic Electronics Laboratory	-	3	100		100
EB/EC/EI **308**	Electrical Machines Laboratory	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester IV

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/EI/ IT/ME/SE **401**	Engineering Mathematics III	4		50	100	150
CS/EB/EC/EI **402**	Microprocessors.	4		50	100	150
EC/EI **403**	Electronic Circuits II	4		50	100	150
EC/EI **404**	Signals and Systems	4		50	100	150
EC/EE **405**	Analog Communication	4		50	100	150
EB/EC/EE/EI **406**	Industrial and Power Electronics	4		50	100	150
CS/EB/EC/EE/EI **407**	Digital Electronics Laboratory	-	3	100		100
EC 408	Electronic Circuits Laboratory I	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester V

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/ EI/IT/ME/SE **501**	Engineering Mathematics IV	4		50	100	150
EC **502**	Electromagnetic Theory	4		50	100	150
EC/EI **503**	Digital System Design	4		50	100	150
EC/EI **504**	Advanced Microprocessors	4		50	100	150
EC/EI **505**	Micro Electronics &Integrated Circuits	4		50	100	150
EC/EI **506**	Digital Signal Processing	4		50	100	150
CS/EB/EC/EI **507**	Microprocessor Laboratory	-	3	100		100
EC **508**	Electronic Circuits Laboratory II	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester VI

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
EC **601**	Digital Communication	4		50	100	150
EC **602**	Microwave Techniques & Devices	4		50	100	150
EC/EI **603**	VLSI Design	4		50	100	150
EC **604**	Electronic Measurements and Instrumentation	4		50	100	150
CS/EB/EC/EI **605**	Control Systems Engineering	4		50	100	150
EC/EI **606**	Embedded Systems	4		50	100	150
EC **607**	Communication Laboratory I	-	3	100		100
EC **608**	Mini Project	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester VII

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CS/EB/EC/EE/EI/ IT **701**	Industrial Organization & Management	4		50	100	150
EC **702**	Radio Communication	4		50	100	150
EC/EI **703**	Computer Communication & Networks	4		50	100	150
EC **704**	Electronic Product Design	4		50	100	150
EC **705**	Elective I	4		50	100	150
EC **706**	Signal Processing Laboratory	-	3	100		100
EC **707**	Communication Laboratory II	-	3	100		100
EC **708**	Seminar	-	2	50		50
EC **709**	Project Design	-	2	50		50
	Total	**20**	**10**	**550**	**500**	**1050**

ELECTIVE I:

EC/EI 705A: Intelligent Systems

EC 705B: Fundamentals of RF Design

EC 705C: Hardware modeling

EB/EC/EI 705D: Mechatronics

Semester VIII

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
EC **801**	Audio & Video Engineering	4		50	100	150
EC **802**	Communication Systems	4		50	100	150
EC **803**	Opto Electronics & Communication	4		50	100	150
EC **804**	Elective II	4		50	100	150
EC **805**	Project Work		14	300		300
EC **806**	Viva-voce				100	100
	Total	**16**	**14**	**500**	**500**	**1000**
				Grand Total	**8000**	

ELECTIVE II:

CS/EC/EE/EI 804 A: Digital Image Processing

CS/EB/EC/IT 804 B: Bioinformatics

EC/EI 804 C: ASIC Design

EC 804 D: Mixed Signal System 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
2. Advanced Engineering Mathematics: Erwin Kreyzig,Wiley Eastern

REFERENCES:

1. Mathematical Techniques: Oxford University Press
2. Engineering Mathematics: T.Veerarajan, TMGH Publishers

Higher Engineering Mathematics: B.S.Grewal, Khanna Publishers

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CE/CS/EB/EC/EE/EI/ME/IT/SE 102: ENGINEERING PHYSICS

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:

Lasers and Holography – Properties of laser light – Coherence of light – Principles of laser action – Population inversion – Optical pumping – Metastable states – Conditions for laser action – 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-Controlled 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 – Superconducting 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*

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CE/ CS/EB/EC/EE/EI/ME/IT/SE103 ENGINEERING CHEMISTRY

Module I

Solid state chemistry: Fundamentals, Bonding in solids, Born-Haber cycle, Point defects, Methods to improve reactivity of solids, Free electron theory, Band theory, Fermi level in semiconductors, Molecular field theory of magnetic materials, Conventional and organic superconductors, High temperature superconductors, Liquid crystals, Applications. Solid surface characterisation: Electron spectroscopy for chemical analysis, Chemical shift, BET isotherm, Thermodynamics of adsorption.

Module II

Electrochemistry: Fundamentals, Electrode potentials, Types of electrodes, Salt bridge, emf measurement, Concentration cells, Acids and bases, Buffer solutions, pH measurements, Polarisation, Overvoltage. Power generation: Secondary cells, Fuel cells, Photovoltaic effect, Solar cells. Corrosion: Different forms of corrosion, Prevention of corrosion.
Chemical Kinetics: reaction rate, rate constant, rate law, reaction order, first order, second order, pseudo-first order reactions, integrated rate laws, half-life of a reaction and its relation to rate constant. Molecularity, simple unimolecular and bimolecular reactions. Arrhenius equation. Fast reactions – flash photolysis, flow techniques and relaxation methods.

Module III
Chemical Thermodynamics: Fundamentals, Molecular interpretation of internal energy, enthalpy and entropy, Heat of reaction, Kirchhof.s 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
Engineering materials: Industrial polymers-polymerization techniques, structure-property relationships, polymer additives, polymer processing methods (extrusion, injection, compression, transfer and blow molding methods). Nanomaterials: definition, classification and applications. Nanometals and nanoceramics – examples and properties.
Lubricants: classification, functions and properties. Mechanism of lubrication.
Refractories: classification and properties. Portland cement, lime and plaster of Paris – manufacture, setting and hardening.
Chemistry of optical fibres, fullerenes and organoelectronic materials (introduction only).

Text Books

1. **Peter Atkins and Julio de Paula** — *Elements of Physical Chemistry*, Oxford University Press, 2005
2. **Shashi Chawla** — *A Text Book of Engineering Chemistry* (3rd edn.).; Dhanpat Rai & Co, New Delhi, 2003.

References

1. **Atkins, P.W.,** *Physical Chemistry*, Oxford University Press, UK, 1998
2. **Bhatnagar, M. S.,** *Textbook of Pure & Applied Physical Chemistry*, A. H. Wheeler & Co, New Delhi, 1999.
3. **Geoffrey Ozin, Andre Arsenault** *Nanochemistry: A Chemical Approach to Nanomaterials*.; Royal Society of Chemistry, U.K. 2005.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CE/CS/EB/EC/EE/EI/IT/ME/SE 104 ENGINEERING MECHANICS

A) STATICS

MODULE I

Concurrent forces in a plane: Principles of statics. Composition and resolution of forces. Equilibrium of concurrent forces in a plane. Method of projection. Method of moments. Friction.

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

Properties of areas: . Moment of inertia of a plane figure with respect to an axis in its plane. Polar moment of inertia. Product of inertia. Principal axes. Mass moment of inertia of material bodies.

General case of forces in a plane: Composition of forces in a plane. Equilibrium of forces in a plane. Plane trusses - Method of joints. Method of sections. Plane frames : Method of members. **Principle of virtual work:** Equilibrium of ideal systems, stable and unstable equilibrium.

B) DYNAMICS

MODULE III

Rectilinear translation: Kinematics of rectilinear motion. Differential equation of rectilinear motion. Motion of a particle acted upon by a constant force, by a force as a function of time and by a force proportional to displacement. Simple harmonic motion. D'Alembert's principle. Momentum and impulse. Work and energy, ideal systems, conservation of energy. Impact.

MODULE IV

Curvilinear translation: Kinematics of curvilinear translation. Differential equations of motion. Motion of a projectile. D'Alembert's principle in curvilinear motion. Moment of momentum. Work and energy in curvilinear motion.

Rotation of a rigid body: Kinematics of rotation. Equation of motion of a rigid body rotating about a fixed axis. Rotation under the action of a constant moment. Compound pendulum. General case of moment proportional to the angle of rotation. D'Alemberts principle of rotation. Resultant inertia force in rotation. Principle of angular momentum in rotation. Energy equation for rotating bodies.

TEXT BOOK & REFERENCES :

1. Engineering Mechanics - Timoshenko and Young - McGraw Hill Book Company.
2. Mechanics for Engineers (Vol. 1- Statics and Vol.2 -Dynamics) - Beer F. P. & Johnston E. R. - Tata McGraw Hill.

3.Engineering Mechanics (Vol. 1- Statics and Vol.2 -Dynamics) - Merriam H. L. & Kraige L. G. - John Wiley and Sons.

4.Engineering mechanics- Biju N- Educational Publishers.

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

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:

1. Engineering Graphics — P.I.Varghese & K.C. John, JET Publishers
2. Elementary engineering drawing — N.D.Bhat, Charotar publishing house
3. Geometric drawing, — P.S.Gill , B.D Kataria &sons Ludhiana
4. Engineering Graphics — P I Varghese, VIP Publishers.

University Examination Pattern

Answer 5 Questions choosing one from each module-20 marks each

CE/CS/EB/EC/EE/EI/IT/ME/SE 106 BASIC CIVIL AND MECHANICALENGINEERING

(A) CIVIL ENGINEERING

MODULE I

Materials: *Cement* - varieties and grade of cement and its uses. *Steel*- types of steel for reinforcement bars, steel structural sections. *Brick*- varieties and strength , tests on bricks.

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 ,,

Levelling : 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
3. A Text book of building construction : N.K.R. Murthy
4. Fundamentals of Civil Engineering- : Roy M Thomas-Educational Publishers.
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 Claussius 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
2. Engineering Thermodynamics — D.B. Spalding & E.H.Cole
3. Engineering Thermodynamics — Van Wylon
5. Thermodynamics — J.P.Holman
6. Elements of Internal Combustion Engines — Rogowsky, Tata McGraw Hill
7. Fundamentals of Internal Combustion Engines — Gill, Smith & Ziurys, Oxford & IBH
8. Refrigeration and Air Conditioning, — Stoecker Tata McGraw Hill

Type of questions for University Examination

PartA -

Question 1- 4 short answer questions of 5 marks each. 2 questions from each module

Question 2-3 – There will be two choices from each module .Answer one question from each module of 15 marks

Part B

Question 4-4 short answer questions of 5 marks each. 2 questions from each module

Question 5-6 – There will be two choices from each module .Answer one question from each module of 15 marks

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

Review of electromagnetic induction -Faraday's Law- Lenz's Law - mutually induced emf. Magnetic circuits - magnetic field of a coil - Ampere turns calculation - magnetic flux - flux density - field strength.
Measuring instruments: Working principle of galvanometer, Ammeter, Voltmeter, watt meter & energy meter.
AC fundamentals: Generation of alternating voltage and current - equations of sinusoidal voltage and current - wave form, cycle frequency, time period, amplitude, phase difference, rms value, average value, power factor & form factor. Vector diagram - addition and subtraction of vectors- sine waves in phase and out of phase. AC circuits: RC, RL, RLC circuits-series and parallel - current, voltage and power relationships. Poly phase circuits: vector representation - phase sequence - star and delta connections.

(B) ELECTRONICS ENGINEERING

Module III

Passive components: Resistor – Capacitor - Inductor - Color coding. Transformer- different types, construction.
Semiconductors: Energy band diagram – intrinsic & extrinsic semi conductors, doping - PN junction – Diodes, Zener diodes- Characteristics - Application of diodes. Rectifiers- Half wave, full wave and Bridge rectifiers – Ripple factor and regulation.
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.
CRO – 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:

1. Basic Electronics – Solid State – B. L. Theraja, S. Chand & Co.
2. Fundamentals of Electrical Engineering – Leonard S. Bobrow, Oxford University Press.

Further References:

1. Electrical Technology : Edward Hughes, Addison Wesley Publication
2. Electronic Devices & Circuits : G.K. Mithal & Ravi Mittal, Khanna Publishers

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CE/CS/EB/EC/EE/E1/IT/ME/SE108 COMPUTER PROGRAMMING

Module 1

Introduction to programming in C: Fundamental data types- integer, floating point, and enumerated data types, typedef 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 out put, control structures, selection statement, **IF, SWITCH, WHILE, DO WHILE, FOR, BREAK, CONTINUE, GOTO, RETURN** statements.

Module 2

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

Module 3

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

Module 4

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

Text Book

1. Mullish & Cooper The Spirit of C An introduction to Modern programming Jaico Publication 1988
2. B.S. Gotfried (Schaum series, TMH)- Programming in C, *

References:

1. Pradeep Dey and Manas Ghosh,"Computer Fundamentals and Programming in C", Oxford 2006
2. Varghese Paul- Computer Fundamentals,* EPD,Kochi
3. Brian W. Kernighan and Dennis M.Richie,"The C Programming Language" PHI,2nd ed.,

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

E/CS/EB/EC/EE/EI/ME/IT/SE 109 TECHNICAL COMMUNICATION AND SOCIAL SCIENCES

(**Module IV Environmental Studies : 1 hour per week**
Other modules : 2 hours per week)

PART - A TECHNICAL COMMUNICATION

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.

PART - B SOCIAL SCIENCES

Module III **(15 hours)**

Science, Technology and Ethics

Impact of science and technology on the development of modern civilization . The philosophy of modern science – scientific determinism – uncertainity principle. Relevance of scientific temper. Science and religion. Science and technology in developing nations. Technological advances of modern India. Intermediate and appropriate technology. Development of technical education in India.
Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professional ideals and virtues - Attributes of an ethical personality – Theories about right action – Self interest.
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.

The concept of sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, water shed management – Resettlement and rehabilitation of people ; its problems and concerns - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust – Population growth and problems of population explosion – Environmental ethics : issues and possible solutions..

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, *Language in Use* . Upper intermediate, self-study workbook & classroom book, Cambridge University Press,2000.

Krishna Mohan & Meenakshi Raman, *Effective English Communication* ,Tata Mc-Graw Hill,2000.

Edmund D. Seebaur & Robert L. Barry *Fundamentals of Ethics for Scientists and Engineers,* Oxford University Press, 2001

Krishna Mohan & Meera Banerji, *Developing Communication Skills* Mac Millan India Ltd,2000.

Rajendra Pal & JS Korlahalli *Essentials of business communication*, S. Chand & Company Ltd

Sarah Freeman, *Study Strategies*, Orient Longman, 1978.

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

University examination pattern
Q I - 4 short type questions of 5 marks, 2 each from module I and II
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one

Part B

University examination pattern
Q I - 5 short type questions of 4 marks, 2 from module III and 3 from module IV
Q II - 2 questions A and B of 10 marks from module III with choice to answer any one
Q III - 2 questions A and B of 20 marks from module IV with choice to answer any one

CE/CS/EB/EC/EE/EI/ME/IT/SE 110 COMPUTER PROGRAMMING LABORATORY

1. Study of OS commands. General introduction to application packages.

2 Programming using C control structures & pointers.

1. Searching & sorting
2. Creation and use of databases in a suitable database package
3. Programming exercises in C.

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

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

ELECTRICAL AND MECHANICALWORKSHOPS

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. Fluroscent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Transformer winding.
10. Soldering practice.
11. Familiarisation of CRO.

MECHANICAL WORK SHOP

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.

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

CE/CS / EB/ EC /EE/ EI/IT/ ME/SE 301 ENGINEERING MATHEMATICS II

Module I

Matrices and Vector spaces: Rank of matrix, Echelon and normal form, Solutions of linear systems of algebraic equations, Eigen values and Eigen vectors, Cayley- Hamilton theorem (no proof).

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 2π , 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:

1. R.K.Jain, S.R.K.Iyengar, *Advanced Engineering Mathematics*, Narosa Publishers.
2. C.R.Wilie & L.C.Barrett, *Advanced Engineering Mathematics*, McGraw Hill Publishers

References :

1. Larry C Andrews,Ronald C Philips, *Mathematical Techniques For Engineers & Scientists*, Phi Publishers
2. M.C.Potter, J.L.Goldberg, *Advanced Engineering Mathematics*, Oxford University Press
3. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publishers

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EB/ EC / EI/IT/ ME 302 ELECTRICAL TECHNOLOGY

Module I

Transformers: working principle and elementary theory of an ideal transformer, Constructional features of single phase transformer, emf equation, turns ratio, vector diagram, equivalent circuit, impedance transformation, transformer losses, flux leakage, efficiency, open circuit and short circuit test, load test. Auto transformer - working principle and saving copper, basic idea of current transformer and potential transformer, distribution and power transformer, applications, standard rating, IS specifications.

Module II

Basic principles of electrical machines: Concepts of motoring and generating action,
DC machines- Main constructional features, principles of operation, types of generators, emf equation, characteristics, applications, armature reaction and commutation, types of motors, torque, speed, and power, characteristics, applications, starting losses, and efficiency, speed control, testing, load test of dc machines.

Module III

AC Machines: Alternator- rotating field, speed and frequency, effect of distribution of winding, coil span, characteristics, emf equation, losses and efficiency, regulation (emf method only), applications, synchronous motor- principle of operation, over excited and under excited, starting, applications, synchronous capacitor.
Induction Motor: Three phase induction motor, principles of operation, and constructional features of squirrel cage and slip ring motors, torque-slip characteristics, starting, speed control, losses and efficiency.
Single phase induction motor: Principle of operation, types of single phase induction motors

Module IV

Generation, transmission & distribution of electrical energy:
Different methods of power generation- thermal, hydro-electric, nuclear, diesel, gas turbine stations (general idea only), electrical equipments in power stations, concept of bus bar, load dispatching, methods of transmission, transmission lines, overhead lines and insulators, corona and skin effect of DC & AC distribution, substation (elementary idea only)

Text Books:

1. F.S.Bimbra, *Electrical Machines* ,Khanna publications

References:

1. B.L.Theraja, *Electrical Machines*, vol I & IV, Khanna Publishers
2. H.Cotton, *Advanced Electrical Technology*,Wheeler publications.
3. Nagarath & Kothari, *Electrical Machines*, Tata McGraw Hill

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 303 NETWORK THEORY

Module I

Review of basic Circuit Concepts and theorems, Passive circuit components, Sources, Standard input signals; Source transformation, Mesh and Node analysis, Network equation for RLC Circuits
Graph of a Network, Trees, Co-trees and loops, Incidence matrix, Cut-set Matrix, Tie-set Matrix and loop currents, Analysis of Networks

Module II

Characterization of two port networks using different parameters; Interconnections of two port Networks, T & π representation; Steady state and transient response, DC and sinusoidal response of RL, RC and RLC circuits, Initial conditions, Rise and decay of current, Time constant, Damping.
Laplace Transforms – Concept, Laplace transform of important Network functions; Transfer function of two port networks, poles and zeros; Application of Laplace Transforms – Solutions of Network Problems.

Module III

Passive filters – Filter fundamentals, Classification of Filters- Low Pass, High Pass, Band Pass & Band Reject Filters. Characteristic impedance, Design of Constant K and m derived filters (all four)- T and π - frequency response, Recursive filters- Butter worth, Chebyshev & Elliptical filters (Concept only)-Frequency response, transfer function.

Module IV

Transmission Lines: Types, Applications, Equivalent Circuit, Primary constants, Transmission Line equations, Input impedance, Secondary Constants, Lossless Line, Distortion less line, Loading of lines, Input impedance of lossless Transmission line, RF lines, Relation between Reflection Coefficient, Load, Characteristic impedances and VSWR, Lines of Different Length - $\lambda/8$, $\lambda/4$ and $\lambda/2$ Lines, Losses in Transmission Lines, Smith Chart and applications, Impedance matching – Single stub& double stub properties

Text Books:

1. D.Roy Choudhury, *Networks and systems*, Wiley Eastern
2. A.Sudhakar and ShyamMohan. S. Pillai, *Circuits and Networks–Analysis and Synthesis* , Tata McGraw Hill, 2002
3. Ryder, *Network Lines and Fields*, Prentice Hall India, 3rd edition
4. G.S.N Raju, *Electromagnetic Field Theory and Transmission Lines*, 2005

References:

1. William B.Stanley, *Network Analysis with applications*, Pearson Education. 4th edition
2. A.Usha Nandini and A.Aravamudan, *Network Theory*, Scitech Publishers, 2004.
3. Dr.D.Ganesh Rao & R.V.Srinivasa Murthy, *Network Analysis – a simplified approach*, Sanguine publishers ,2005.
4. Bruce Carlson, *Circuits*, Thomson Learning, 2006
5. Boylestead, *Introductory Circuit analysis*, 5th Ed.,UBS, 2003.
6. DeCarlo / Lin, *Linear Circuit Analysis*, - Oxford University Press, 2005.
7. *Schaum's 3000 solved Problems in Electric Circuits, Book 1,2* ,McGraw Hill

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EB/EC/EI 304 DIGITAL ELECTRONICS

Module I

Number system and codes : Binary , Octal, and Hexadecimal number systems - Binary arithmetic, Binary coded Decimal , Excess - 3 code, Gray Code, Error detection and correction - Boolean algebra -Minimization of Boolean function using Karnaugh Map and Quine - McClusky methods – Formation of switching functions from word statements , realisation using NAND, NOR. Combinational circuits- multiplexer demultiplexer, decoder, encoder

Module II

Sequential circuits: Flip-flops - RS, JK & T & D flip- flops, shift registers - counters -Asynchronous and synchronous counters, Up-Down counter, modulo counter, Ring counter, Johnson counter - sequence generators - state tables and diagrams

Module III

Arithmetic circuits : Half adder, Full adder , Subtractor, Serial and parallel addition - Carry look ahead adder - Binary multiplication and division - Multivibrators - Monostable and astable multivibrators using discrete gates . Memories –ROM, RAM, EPROM

Module IV

Logic families: DCTL, RTL, DTL, TTL, ECL, CMOS - Tri-state logic - specification and transfer characteristics of basic TTL - Standard logic levels - Current and voltage parameters - fan in and fan out - Propagation delay, noise consideration- interfacing of CMOS to TTL and interfacing of TTL to CMOS

Text Book:

1. A. Anand Kumar, *Fundamentals of Digital Circuits*, Prentice-Hall India Ltd, 3rd edition.

References :

1. J.M.Yarbrough, *Digital Logic, Applications & Design*,Thomson Learning, I edition
2. Flyod & Jain, *Digital Fundamentals*, Pearson Education, 8th Edition,
3. R P Jain, *Modern Digital Electronics*, Tata Mc Graw Hill
4. R. K. Gaur, *Digital Electronics and Microcomputers* , Dhanpat Rai and Sons ,3rd Edition.
5. Taub & Schilling, *Digital Integrated Electronics*, Mc Graw Hill
6. Malvino and Leach, *Digital Principles and Applications*, Mc Graw Hill
7. Charles H.Roth , *Fundamentals of Logic Design*, Thomson Publishers, 5th ed.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 305 SOLID STATE ELECTRONICS

Module I

Band theory of solids - Conductors, semiconductors and insulators - energy band diagram. -Semi conductor materials and their properties: elemental semiconductors- the energy band model of semiconductors. Valance band model of semiconductor equilibrium concentration of electrons and holes- the fermi level and energy distribution of carriers inside the bands- temperature dependence of carrier concentration inside the bands. - Carrier transport in semi conductors - drift of carriers in electric fields, carrier flow by diffusion - constancy of fermi level across junction, Excess carriers in semi conductors - injection of excess carriers - recombination of excess carriers - continuity equation - current flow equation.

Module II

PN junction- Abrupt PN junction - energy band diagram - barrier potential, biasing PN junction, excess carrier calculation - current components diffusion - drift - boundary conditions for long and short diodes - PN junction characteristics - calculation of diffusion – depletion layer capacitance - simple model - transient ac condition -principle of zener and avalanche diodes - photodiodes - - tunnel diode and PIN diode -varactor diode.

Module III

Bipolar junction transistors - NPN, PNP types, Basic structures - biasing - mechanism of carrier flow - current components in transistors boundary conditions in active region - solution for short base width - base width modulation - Transistor configurations - Characteristics - current amplification factors - relations between alpha & beta - comparison Ebbers - Moll model - - basic principles of phototransistors - UJT, characteristics. Semiconductor heterojunctions - V-I characteristics - real heterojunctions - frequency limitation of transistor - transit time effect

Module IV

Field effect transistors: JFET - basic structures - principle of operation - Characteristics and current equation, MOSFET - semiconductor surfaces - C - V characteristics - the Si - SiO2 System - basic structures and operating principles - current equation - V-I characteristics - simple model – CMOS- structure, operation.

Text Books:-

1. B.G.Streetman , *Solid State Electronics Devices*, Pearson Education,
2. Suresh Babu ,*Solid State Devices & Technology*, Sanguine Tech. Publishers

References

1. *Electronic Devices* , Learning Material Series, ISTE, NewDelhi ,1997
2. Millman & Halkias ,*Electronic Devices & Circuits*, Mc Graw Hill
3. George B Rutkowski ,*Solid state electronics*, Mc Graw Hill ,IV th edition
4. S.S.Islam, Semiconductor Physics and Devices, Oxford University Press, 2006
5. Dr. Achuth & Dr. K.N.Bhatt, *Solid State Devices*, Tata Mc Graw Hill

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 306 ELECTRONIC CIRCUITS I

Module I

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 - simple voltage regulator. Series regulators - IC regulators.

Module II

BJT Amplifiers: Units of gain, CE amplifier- Biasing techniques - stabilization of operating point –compensation techniques- low frequency equivalent circuits - r-parameters, h-parameters Methods of coupling - D.C coupled amplifier - CE RC coupled amplifier - concept of load lines- loading effect at the input and output - emitter follower as Buffer stage- Darlington emitter follower-Boot strapping – High frequency equivalent circuit of CE amplifier-hybrid π model - frequency response of RC coupled amplifier - frequency analysis of R C coupled amplifier - lower cut-off frequency - upper cut-off frequency - 3 db bandwidth - Frequency response of DC coupled amplifier.

Module III

FET Amplifier: FET biasing- Low frequency equivalent circuit- RC coupled common source amplifier - expression for gain - frequency response - FET source follower- - FET as a voltage variable resistor –comparison of FET with BJT. CMOS biasing-Amplifier ckts, Multistage Amplifier.

Module IV.

Pulse circuits: pulse characteristics - Pulse shaping using RC circuits - Differentiating and integrating circuits - clipping and clamping circuits using diodes and transistors - Transistor as a switch- sweep circuits - Transistor sweep circuits - voltage and current sweep - Miller sweep circuit - Bootstrap sweep circuit - UJT relaxation oscillator. Multivibrators using transistors - astable - monostable and bistable operation

Text books:

1. Boylsted & Nashelsky, *Electronic Devices and circuits'* , Pearson Education, 9th edition.
2. Bogart , *Electronic Devices and circuits* , Pearson Education, 6th edition.
3. Milman & Taub ,*Pulse Digital & Switching waveforms* , Tata Mc Graw Hill

References:

1. Milman & Halkias, *Integrated Electronics* , Tata Mc Graw Hill
2. Sedra & Smith , *Microelectronic circuits*, Oxford University Press, 5th edition.
3. Schilling & Belove, *Electronic Circuits, Discrete & Integrated* , Tata Mc Graw Hill
4. *2000 Solved problems in Electronics: Shaum series,* Mc Graw Hill Publishers, 1990
5. Allen Mottorshed, *Electronic Devices & Circuits* , Prentice Hall of India, 2003

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EB/EC/EI 307 BASIC ELECTRONICS LABORATORY

1. Study of - Multimeter, Signal generators , CRO etc. and measurement of electrical quantities (V,I,FREQUENCY,PHASE)
2. Testing of Passive and Active components - Resistors , Capacitors, inductors , Transformers , diodes , Transistors, etc.
3. Characteristics of Active devices
   i) Forward and reverse characteristics of a diode - measurement of forward resistance
   ii) Common base characteristics of a transistor - measurement of current gain, input resistance and output resistance, maximum ratings of the transistor.
   iii) Common emitter characteristics of a transistor - measurement of current gain, input Resistance and output resistance, relation between and study of the effect of leakage Current, maximum ratings of the transistor.
   iv) Common source characteristics of a JFET - measurement of transconductance gm and drain to source resistance rds , use of FET as VVR.
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. Zener Regulator
6. Design and implementation of Power supplies
7. Biasing of Active devices
   i) Voltage biasing, current biasing and Feedback biasing of BJT
   ii) Biasing of JFET
8. Series Voltage Regulator using transistors.

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

EB/EC/EI 308 ELECTRICAL MACHINES LABORATORY.

Compulsory experiments

1. (a) Preliminary study of AC and DC Power supplies in the laboratory.
   (b) Study of instruments and their mode of use
2. Open circuit characteristics of
   (a) Self excited generator
   (b) Separately excited generator.
3. Load characteristic of compound generator
4. Load characteristic of shunt generator
5. Study of face plate starter and starting of DC motors
6. Load characteristics of DC series motor.
7. Swinburn's test
8. Polarity and transformation ratio test on single phase transfer.
9. O.C & SC test on single phase transformer - equivalent circuit
10. Load rest on single phase transformer.
11. Study of starting methods of squirrel cage and slip ring induction motor.
12. Load test on slip ring induction motor and study of characteristics.

Optional Experiments

1. Study of single-phase motors.
2. Load test of DC shunt motor.
3. Poly phase connection of single phase transformer.
4. Load test on squirrel cage induction motor
5. Study of alternators.

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

CE/CS / EB/ EC /EE/ EI/IT/ ME/SE 401 ENGINEERING MATHEMATICS III

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, F1(x,p) = F2 (y,q), Lagrange's form Pp+Qq = R. Linear homogeneous partial differential equations with constant co-effients.

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:

1. R.K.Jain, S.R.K.Iyengar, *Advanced Engineering Mathematics*, Narosa Publishers.
2. C.R.Wilie & L.C.Barrett ,*Advanced Engineering Mathematics*, Mc Graw Hill

References:

1. Ervin Kreyszig, *Advanced Engineering Mathematics*, Wiley Eastern
2. Churchill R.V, *Complex Variables & Applications*, Mc Graw Hill Publishers.
3. M.C.Potter, J.L.Goldberg, *Advanced Engineering Mathematics*, Oxford University Press

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/EI 402 MICROPROCESSORS

Module I

Introduction to 8 bit microprocessor: Microcomputers and microprocessors, 8/ 16/ 32/ 64-bit microprocessor families; Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details of pins, Control signals, External Address / Data bus multiplexing, Demultiplexing, I/ O mapped I/ O, and memory mapped I/ O techniques. Interrupts, Serial communication and DMA features

Module II

Assembly Language Programming: 8085 instruction set: Instructions, Classifications, Addressing modes, Stack and Subroutines, Delay routines, Counters etc. Programming examples.

Module III

Instruction Timing and Interrupts: Timing Diagrams (of various instructions): T- state, Machine cycle (Opcode fetch, Read / Write, Interrupt Acknowledge, Bus Idle, etc), Interrupts: -types (h/ w and s/ w), Maskable / Non maskable, their organization.

Module IV

Interfacing concepts and devices:
Memory interface: Concept of memory chip/ chips interface to 8085 with appropriate examples Programmable interfacing devices: - Programmable peripheral interface (Intel 8255), Programmable timer interface (Intel 8253/ 54), Programmable display / Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251)-(their architecture, register organization, initialization, hard ware and software inter face to 8085.

Text Books:

1. Ghosh and Sridhar, *0000 to 8085 Microprocessors for Engineers and Scientists,* Prentice-Hall India, 2nd edition
2. Gaonkar , *Microprocesors, Architecture, Programming and Applications*, Wiley Eastern, 4th edition

References:

1. A.Nagoor Kani, *Microprocessors,architecture and programming,*RBA Publications
2. Douglas V.Hall , *Microprocessors,Interfacing and Peripherals,*Prentice Hall India

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 403 ELECTRONIC CIRCUITS II

Module I

Feedback amplifiers: Negative and positive feedback - Different types of negative feedback amplifier - voltage shunt-voltage series - current shunt - current series .Oscillators - Principle of sinusoidal oscillators - Bark Hausen criteria - RC oscillators - phase shift- Wienbridge - LC oscillators - Hartley , Colpitts -clapp oscillator, crystal oscillator.

ModuleII.

Power amplifiers -classification - class A , class B, Class AB, Class C and class D - Transformer coupled class AB Power amplifier - Transformerless class AB push-pull Power amplifier - complementary symmetry power amplifier - Harmonic distortion in Power amplifiers - Transistor rating -Heat sinks -Switching amplifiers

Module III

High frequency amplifier – Filter Design and Tuned amplifier - coupled circuit, unilateralisation of transistor, Q-factor, single tuned, double tuned and stagger tuned amplifier (analysis not required) - Wide band amplifier: Gain-bandwidth trade off. Wide band transistor configuration cascade emitter coupled - broad banding, bandwidth trade-off, wide band transistor configuration with negative feed back, frequency compensation - low frequency RC compensation High frequency compensation (analysis not required)

Module IV.

Differential amplifier:- Basic differential amplifier - dual input balanced output and unbalanced output- Internal block schematic of op amp - Biasing used in IC- Constant current source- Current mirror Circuits- Active Load – Level Shifters- Power amplifier stages. Power supply requirements.

Text Book:-

1. Sedra & Smith , *Microelectronic circuits*, Oxford University Press, 5th edition.

Reference :-

2. Millman & Halkias , *Electronic Devices & Circuits*, Tata Mc Graw Hill
3. Bapat K N , *Electronic Devices & Circuits ,* Mc Graw Hill
4. Millman & Taub, *Pulse Digital and Switching Waveforms*, Tata Mc Graw Hill
5. Millman & Halkias , *Integrated Electronics*, Tata Mc Graw Hill
6. Boylestead & Neshelsky , *Electronic Devices & Circuits*, Pearson Education, 9th edition.
7. Schilling & Belove, *Electronic Circuits ,Discrete & Integrated ,* Tata Mc Graw Hill
7. R.S.Moni, *Amplifiers*, Wiley Eastern
8. Gaykwad, *Op-amps and Linear integrated Circuits*, Pearson Education, 4th edition.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 404 SIGNALS AND SYSTEMS

Module I

Continuous Time signals: Energy and Power signals, Exponential and sinusoidal signals, periodicity, Impulse and step signals. Continuous Time systems: Properties- Linearity, stability, causality, memory, invertibility, time invariance. Analysis of LTI System – impulse response- convolution-graphical analysis-properties of convolution, Differential equation representation.
Frequency analysis of CT systems - Fourier series Fourier Transform .Properties Convolution, multiplication,correlation,Parseval's relationship,Examples.Inverse relationship between time and frequency, Time- Bandwidth product, Signal Spectrum

Module II

Discrete Time signals: Energy and Power signals, Exponential and sinusoidal signals, periodicity, Impulse and step signals. Discrete Time systems: Properties:Linearity, stability,causality,memory,invertibility time invariance. Representation of systems- impulse response- convolution - Difference equation representation.
Frequency analysis of DT systems: Discrete Time Fourier Series Discrete Time Fourier Transforms, Z Transforms: Properties Analysis of LTI systems using Z transforms the inverse Z transform - System function. Sampling of CT and DT signals. Sampling Theorem Nyqust rate. Reconstruction -- ideal, zero order hold.

Module III

Random Signals and systems: Review of random variables and pdf. Random processes, statistical averages.Stationary processes, Ergodic processes. Random processes and LTI systems. Random processes in frequency domain Power spectrum of stochastic processes, variance Auto correlation and spectral densities - Properties Power spectral density. Gaussian , Rayleigh, Rice probability density-and White processes, band limited and band pass processes.

Module IV

Noise: .White noise, Narrow band noise, effective noise temperature and noise figure representation Sinewave contaminated with narrow band noise.Effect of noise in Systems; eg: Linear and angle modulation systems, threshold effect and threshold extension, pre-emphasis and de-emphasis filtering. Introduction to Detection and estimation, Matched filters

Text Books:

1. Openheim & Wilsky, *Signals & systems* , PHI/Pearson Education
2. Simon Haykin, *Communication Systems*, John Wiely
3. Proakis & Salehi , *Communication Systems* , Pearson Education, 2006

References :

1. A.Ambardar, *Analog & Digital Signal Processing*, Thomson Learning, 2nd Edition
2. B P Lathi , *Linear signal & Systems* ,Oxford University Press,2nd edition
3. C L Phillips .J M . Parr. E A Riskin , *Signals,Systems, And transforms* Pearson Education ,3rd Edition
4. R E Ziemer ,W H Tranter, D .R Fannin , *Signals and Systems* , Prentice Hall ,Fourth Edition
5. S S Soliman, M D Srinath, *Continuous and discrete signals and systems*, Prentice Hall India
6. Stark/Wood, *Probabilty and random process with application to Signal Processing*, Pearson Edu., 3rd ed.
7. Hwei-Hsu, *Analog & Digital Communication*, Schaums series, McGrawHill, 2nd edition

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EE 405 ANALOG COMMUNICATION

Module I.

Introduction–communication process, source of information, communication channels; Modulation – need, band width requirements – electromagnetic spectrum. Amplitude modulation – principles – visual concepts, modulation factor and percentage of modulation, mathematical relationship, component phasors, frequency spectrum, band selection. Amplitude modulators – ISB modulators – VSB modulation. AM transmitters – low level, high level – SSB systems – comparisons, mathematical analysis, SSB generation –SSB transmitters – filter method, phase shift method, third method. AM receivers – TRF receivers, Super heterodyne receiver, Double Super heterodyne receiver – SSB receiver – BFO, envelope detection, multi-channel Pilot carrier.

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– demodulators – 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.

Noise – external, internal – noise calculations, multiple noise sources, equivalent noise band width – Noise figure – Effective noise temperature, noise figure in terms of available gain – Noise in AM, angle modulation, pulse modulation – Performance of Communication systems – noise representation- Comparison of coded and uncoded systems - Characteristics of receivers – sensitivity, selectivity, double spotting, SNR – AGC circuitry – Performance of communication receivers – Comparison study of AM, FM and PM.

Module IV.

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

Text Books:

1. George Kennedy, *Electronic communication systems*, McGraw Hill ,4th edition
2. Thiagarajan-Viswanathan, *Telecommunication Switching Systems and Networks*, Prentice Hall, 2001

References:

3. Simon Haykin, *Communication Systems*, John Wiley & Sons, 2004.
4. Robert J Schoenbeck, *Electronic Communications Modulation & Transmission*, Prentice Hall, 2nd Ed.
5. Wayne Tomasi, *Electronic Communications Systems (Fundamentals through Advanced)* , Pearson Education 5th Ed.
6. B.P.Lathi, *Communication Systems*, B.S Publication, 2001
7. Taub & Schilling, *Principles of Communication Systems* ,Tata McGraw Hill, 1991
8. Roddy & Coolen, *Electronic Communications*, Pearson Education 4th Ed.
9. D.N.Krishnakumar, *Telecommunication & Switching*, Sanguine Publishers, 2006

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EB/EC/EE/EI 406 INDUSTRIAL AND 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 - multiquardrant 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 invertor - 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.

Static switches: dc & ac switches-1φ and 3φ switches-design of static switches-Solid state relays.
Switching regulators - Basic concepts, analysis and design of Buck, Boost, Buck-Boost and derived converters .
UPS - Characteristics - Configuration – Application. Batteries: Characteristics and selection-charging circuits.
Thyristor protection - over current, over voltage, di/dt, dv/dt, gate protection.
Industrial applications: Timer circuits - Flasher circuits-Electronic ballast, dielectric heating, induction heating.

Text Book:

1. Muhammed H. Rashid, *Power Electronics – Circuits, Devices and Applications*, Prentice Hall of India , New Delhi, 1994.

References:-

2. *Power Electronics*, IMPACT Learning Material Series, Indian Society for Technical Education.
3. J. Michael Jacob, *Power Electronics: Principles & Applications*, Thomson, New Delhi, 2006
4. B. K. Bose, *Modern Power Electronics And AC Drives*, Pearson Education
5. Biswanth Paul, *Industrial Electronics and Control,* Prentice Hall of India, New Delhi, 2002
6. D W Hart, *Introduction to Power Electronics*, Pearson Education.
7. P C Sen, *Power Electronics*, Tata Mc Graw Hill
8. Singh & Khanchandani , *Power Electronics*, Tata Mc Graw Hill.
9. Asghar M syed , *Power Electronics* Prentice Hall of India
10. N Mohan, *Power Electronics* , John Wiely
11. Hays , *The art of Electronics* , Cambridge University Press

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/EE/EI 407 DIGITAL ELECTRONICS LABORATORY

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.
11. Astable and monostable multi- vibrators using TTL gates.
12. Transfer characteristics and specifications of TTL gates

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

EC 408 ELECTRONICS CIRCUITS LABORATORY I

I Clipping and clamping circuits using diodes / transistors

II. Study of RC and RLC circuits - Frequency responses, pulse response, Filter characteristics,

III. Differentiating circuit and integrating circuit

IV Amplifying circuits

(i) Simple common emitter amplifier configuration - gain and bandwidth.

(ii)Common source amplifier

Functions of each component, gain measurement, frequency responses

V Feedback amplifier circuits - Current series and voltage shunt - gain and bandwidth..

VI Oscillators - RC phase shift. Wein Bridge, crystal oscillator

VII Multivibrators - Astable , Bistable,monostable.

VIII Switch& Sweep circuits - Simple transistor sweep, bootstrap sweep.

IX Power amplifiers

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

CE/CS / EB/ EC /EE/ EI/IT/ ME/SE 501 ENGINEERING MATHEMATICS- IV

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),σ known), the sampling distribution of the mean (σ(the sampling distribution of the variance, 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:∇, Δ, E, δ, μ , $x^{(n)}$
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:

1. Irvrin Miller & Freind , *Probability And Statistics For Engineers,* Prentice Hall of India
2. S.S.Sastry, *Numerical Methods*, Phi Publishers.

References:

1. P.Kandaswamy K.Thilagavathy, K.Gunavathy , *Numerical Mehtods*, S.Chand & Co.
2. A.Papoulis, *Probability,Random Variables And Stochastic Processes,*,Mc Graw Hill Publishers

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 502 ELECTROMAGNETIC THEORY

Module 1

Vector Analysis : Vector Algebra, Coordinate Systems and Transformation – Cartesian, Cylindrical and spherical coordinates, constant-coordinate surfaces, Vector Calculus – Differential length, area and volume, Line, surface and volume integrals, Del operator, Gradient of a scalar, Divergence of a vector, Divergence Theorem, Curl of a vector, Stoke's Theorem, Laplacian of a scalar, Classification of vector fields.

Module 2

Electrostatics: Electrostatic Fields – Coulomb's Law and field intensity, Electric fields due to continuous charge distributions, Electric flux density, Gauss's Law, Applications of Gauss's Law, Electric Potential, Relationship between E and V, Electric dipole, Energy density in Electrostatic fields.
Electric fields in material space – Properties of materials, Convection and conduction currents, Conductors, Polarization in Dielectrics, Dielectric constant and strength, Linear, isotropic and homogeneous dielectrics, Continuity equation, relaxation time, Boundary conditions.
Electrostatic Boundary value problems–Poisson's and Laplace's Equations, Uniqueness Theorem, Resistance and capacitance [Parallel-plate, coaxial, spherical capacitors].

Module 3

Magnetostatics and Maxwell's equations: Magnetostatic fields – Biot-Savart's Law, Ampere's circuital law, Applications of Ampere's circuital law, Magnetic flux density, Magnetic scalar and vector potentials. Magnetic forces, Materials and devices – Forces due to magnetic fields, Magnetic torque and moment, Magnetic dipole, Magnetization in materials, Classification of Magnetic Materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy, Magnetic circuits. Faraday's Law, Displacement current, Time-harmonic fields, Maxwell's equations for static fields and time varying fields, Word statement.

Module 4

Electromagnetic wave propagation : Electromagnetic waves-Wave propagation in lossy dielectrics- Wave equations from Maxwell's equations, propagation constant, intrinsic impedance of the medium, complex permittivity, loss tangent, Plane waves in lossless dielectrics, Plane waves in free space – uniform plane wave, TEM wave, Plane waves in good conductors – skin effect, Poynting vector, Poynting's Theorem, Reflection of a plane wave at normal incidence – standing waves, Reflection of a plane wave at oblique incidence – parallel and perpendicular polarization, Brewster angle. Numerical Methods in Electromagnetics – Finite Difference, Finite Element and Moment method [Only the concept need be introduced – detailed study not required]

Text Books:

1. Matthew N. O. Sadiku, *Elements of Electromagnetics*, Oxford University press, 2004.
2. Jordan and Balmain, *Electromagnetic waves and radiating systems*, Pearson Education ,2nd Ed., 2006.

Reference:

1. Kraus Fleisch, *Electromagnetics with Applications* ,McGraw Hill ,1999.
2. Cheng, *Field and Wave Electromagnetics,* Pearson Education ,2005.
3. N.Narayana Rao, *Elements of Engineering Electromagnetics* ,Pearson Education, 2006.
4. William.H.Hayt, Jr and John A.Buck, *Engineering Electromagnetics*, Tata McGraw Hill, 2004.
5. Joseph A. Edminister, *Electromagnetics*, Schaum series - McGraw Hill ,1993.
6. D.GaneshRao and C.Narayanappa, *Engineering Electromagnetics*, Sanguine Technical Publishers, 2004.
7. Guru Hiziroglu, *Electromagnetic Field Theory Fundamentals ,* Thomson ,2003.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 503 DIGITAL SYSTEM DESIGN

Module I

Introduction to combinational modules and modular networks. Standard combinational modules, design of arithmetic modules. Programmable Logic Array, Devices- Basic ideas, PLD architecture- PAL & PLA, Implementation of combinational systems with decoder, multiplexers, ROMs and PLAs. Implementation of multimodule combinational systems- decoder networks, Mux trees, demux network, encoder network. Shifter network and barrel shifters

Module II

Introduction to digital systems, Synchronous and asynchronous- state diagram, state names, Mealy and Moore machines binary description. Time behavior of synchronous sequential systems, Minimization of no. of states, Specification of various types of sequential system

Module III

Canonical implementation - analysis and synthesis of networks in the canonical implementation, Flip flop modules and networks. Standard sequential modules-Registers - shift register - counters - RAM - content addressable memories and programmable sequential arrays (PSA).

Module IV

Design of sequential systems with small number of standard modules, State register and combinational networks - use of ROMs in sequential networks - Counter and combinational networks - RAM and combinational networks - SR and combinational networks. Multimodule implementation of sequential systems - Multimodule registers - Shift registers and RAMs - Multimodule counters.

Text Book:

1. Milos D Ercegovac, Tomas Lang, *Digital systems and hardware / firmware algorithm*, John Wiley

References :

1. Charles H.Roth , *Fundamentals of Logic Design*, Thomson Publishers, 5th ed.
2. J.M.Yarbrough, *Digital Logic, Applications & Design*,Thomson Publishers,I edition
3. Zvi Kohavi, *Switching and Finite automata Theory*, Tata Mc Graw Hill
4. Comer, *Digital Logic State Machine Design* , Oxford University Press, 3rd edition

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC /EI 504 ADVANCED MICROPROCESSORS

Module I

Architecture 16 bit microprocessors: Intel 8086 Architecture Memory address space and data organization Segment registers and memory segmentation I/O address space- Addressing modes Comparison of 8086 and 8088. Basic 8086/8088 configuration, Minimum mode-Maximum mode

Module II

Intel 8086 programming: 8086 Instruction set. Instruction Classifications, Program development tools: editor, assembler, linker, locator, debugger and emulator. Use of DEBUG and MASM

Module III

Architecture of 32 bit Microprocessors: Intel 80386 Architecture, Block Diagram, Segmentation, Paging, Real, Protected and Virtual modes, 80486 microprocessor Architecture, Block Diagram, Pentium Architecture Block Diagram, Superscalar Architecture, Branch Prediction. PentiumII, Pentium III, PentiumIV Processors (Block Diagram only).

Module IV

Introduction to micro controllers - comparison with microprocessors Study of micro controller (MCS 51 family- 8051) - Architecture, instruction set, addressing modes and programming - Comparison of various families of 8bit micro controllers. Interfacing of ADC, sensors, keyboard and DAC using microcontrollers

Texts :

1. Barry B.Brey, *The INTEL Microprocessors - 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium and Pentium pro processor, Pentium II, Pentium III, Pentium 4 - Architecture, Programming and interfacing*, Prentice Hall of India , 6 Ed, 2003.
2. Kenneth Ayala, *The 8051 Microcontroller* ,West Publishing Company.
3. Mazidi ,*The 8051 Microcontrollers & Embedded Systems*, Pearson Education.

References:

1. A.K.Ray &K.M.Bhurchandi, *Advanced Microprocessors and peripherals* , Tata Mc Graw Hill, 2000.
2. YU-Cheng Liu & Glenn A Gibson, *Microprocessor System , Architecture Programming & Design*, Prentice Hall, Inc., 1986.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC /EI 505 MICROELECTRONICS& INTEGRATED CIRCUITS

Module I

Introduction to operational amplifiers –Internal block schematic of op amp - Op-amp parameters - ideal op amp - transfer curve - equivalent circuit –Open loop gain –input and output impedance – Frequency response, frequency compensation. Slew rate and its effect; Input bias current –offset - drift - compensating networks CMRR, SVRR, finite gain bandwidth and its effect in opamp circuits' performance. Open loop configurations Op amp in closed loop configuration: Different feed back configurations- Voltage series feedback and voltage shunt feedback - concept of virtual ground- linear circuits: Summer- Subtractor Integrator and differentiator voltage follower - V/I converters, I/V converters and its applications - Differential amplifiers with one op amp and 3 op amps- Use of offset minimizing resistor (R_{OM}) and its design. Instrumentation amplifier IC and its application

Module II

Op amp applications- Log amplifier- Antilog amplifier- Comparators: zero crossing- using voltage reference- regenerative (Schmitt trigger) comparators, window detector application – OPAMP as comparators - Astable and monostable multivibrators- Triangular and saw tooth wave generators- - RC phase shift and Wien bridge oscillators-Sample and hold circuit- Peak detector circuit. Precision rectifiers.
Filters : Transfer functions – LPF ,HPF,BPF, BRF Approximation methods –Butter worth – Chebyshev -Active Filters - I order and II order filters, Quality factor –Design- Gyrator- Negative Impendence Converter-Filter using Simulated Inductance –Universal Active Filters –All Pass filters. Switched Capacitive Filters

Module III

Specialized ICs and applications: Voltage regulator IC 723, current limiting, short circuit protection, Thermal protection -555 timers – Functional block diagram- Astable multivibrator, monostable multivibrator and its applications.- 566 VCO chip- Phase locked loop(PLL) - block diagram ,Mathematical Derivation of capture rage , lock range and pull in time capture and lock range- 565 PLL - PLL applications: Frequency multiplication and division- AM demodulation- FM detection- FSK demodulation Analog multiplier circuits and applications. ADC and DAC –performance specification –weighted, R-2R ; successive approximation , flash, integrating.

Module IV

Introduction to Microelectronics: Monolithic and hybrid Ics- Bipolar & MOS Technology- Fabrication of active and passive components, bonding, packaging, - Concepts of SSI, LSI, VLSI. Introduction to thick film and thin film Technology – resistors- capacitors- comparison

Text Books:

1. R F Coughlin , *Op amps and Linear Integrated circuits* , Pearson Education/PHI
2. Sargio Franko , *Design with operational Amplifiers Analog IC*s , McGraw Hill, 2nd Edition
3. Millman & Grabel ,*Microelectronics* , Tata McGraw Hill ,2nd edition

References:

1. Gaykwad ,*Op-amps and Linear integrated Circuits*, Pearson Education, 4th edition
2. K R Botkar , *Integrated circuits,* Khanna Publishers
3. Gray, *Analog Integrated Circuits,* John Wiley, 2nd edition
4. Horstian , *Micro Electronics*, Prentice-Hall India, 3rd edition
5. Sedra & Smith,*Microelectronic circuit* , Oxford University Press,3rd edition
6. D A Bell, *Opamps and Linear integrated Circuits* ,Prentice-Hall India ,2nd Edition .

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 506 DIGITAL SIGNAL PROCESSING

Module I.

Discrete Fourier Transform and properties - Fast Fourier Transform Decimation in time FFT algorithms - decimation in frequency FFT algorithms - FFT algorithms for N a composite number, Block convolution, Discrete Hilbert transform– Other discrete transforms -.Discrete Cosine transform- Wavelet transforms.

Module II.

FIR filter design using Fourier series - window functions - frequency sampling technique-Introduction to digital filter design – specifications- FIR Digital Filters - Realizations - direct - cascade - lattice forms - hardware implementation - Finite word length effects in FIR filter design- Applications of FIR filters.

Module III.

Analog filter approximations - Butterworth and Chebychev approximations – - IIR Digital Filters -Transformation techniques-The method of mapping of differentials - impulse invariant transformation - Bilinear transformation - Matched Z transform technique – IIR Filter Realizations - Direct - Cascade - Parallel forms - hardware implementation - - Finite word length effects in IIR filter design-effects due to truncation and rounding-limit cycles- Applications of IIR filters

Module IV.

General DSP architecture- features _ on chip subsystems- memory organization-Addressing modes- Instruction types - TMS320C54X fixed point processor- TMS320C4X floating point processor-ADSP21XXX sharc processor.

Reference :-

1. John G Proakis & Dimitris G Manolakis , *Digital Signal Processing*,Pearson education,3rd edition
2. Oppenheim & Ronald W Schafer, *Digital Signal Processing*, Pearson education, 2nd edition
3. Ashok Ambardar, *Digital Signal Processing* , Thomson Learning, 2007.
4. Andreas Antoniou , *Digital Filters Analysis & Design*, Prentice Hall India , 2nd edition
5. Avtar Singh & Srinivas, *Digital Signal Processing*, Thomson Learning, 2004
6. Sanjit K.Mithra ,*Digital Signal Processing*, Tata Mc Graw Hill, 3rd edition.
7. Emmanuel C. Ifeachor & Barni W.Jerris,*Digital Signal Processing ,a practical approach*, Pearson education
8. Charles S.Williams,*Designing digital filters*, Prentice Hall
9. JAE S.Lim, Alan V.Oppenheim, *Advanced topics in signal processing*, Prentice Hall

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/EI 507 MICROPROCESSOR LABORATORY

PART I – 3 Lab sessions

Part I A (Compulsory)

1. Study of a typical microprocessor trainer kit and its operation
2. Interfacing and programming of 8255.(eg: traffic light control, burglar alarm, stop watch)
3. Interfacing and programming of 8253/ 8254.
4. Interfacing and programming of 8279.

Part I B*

1. A/D and D/A converter interface
2. Stepper motor interface
3. Display interface
4. Programming of different types of EPROM 2716, 2732 etc

(* At least two topics from part B has to be covered.)

PART II – 7 Lab sessions

(Compulsory)

1. Introduction to IBM/PC and its DEBUG program commands
   - Examining and modifying the contents of the memory
   - Assembling 8086 instructions with the ASSEMBLER commands
   - Executing 8086 instructions and programmes with the Trace and GO Command.
   - Debugging a program
2. Assembly language program development using IBM/PC Macro assembler
   - Creating an Assembler source file
   - Assembling source program with MASM
   - The link program - creating a RUN module
   - Typical programming examples.
3. Interfacing Experiments with micro controllers

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

EC 508 ELECTRONIC CIRCUITS LABORATORY II

PART A (Compulsory)

I Linear circuits
Circuits using OP- Amps - Inverting & non inverting amplifiers , Summing Amplifier, Differential Amplifier, Instrumentation Amplifier, Integrators & Differentiators , Measurements of offset voltage and its compensation .Precision rectifiers

II Circuits using op-amps for waveform generation.
i) Astable, monostable multivibrators .
ii) Wein bridge oscillator
iii) Triangular, square wave form generators.

III Second order Active RC filters
High pass, low pass

IV Astable and monostable multi-vibrators circuit using 555

V PLL 565, voltage regulator 723

VI Filters using simulated inductance

PART B (*)

1. Characteristics of SCR, TRIAC, MOSFET
2. Trigger circuits for full wave/halfwave fully controlled / half controlled thyristor circuits.
3. Study of phase control rectifier - Resistive load, inductive load, free wheeling diode.
4. Study of motor speed control.
5. Study of UPS / SMPS

* Atleast two topics from part B has to be covered.

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

EC 601 DIGITAL COMMUNICATION

Module 1

Introduction to Digital Communication: Random variables & random process-Detection & Estimation: G-S Procedure, Geometric Interpretation of signals, Response of bank of correlators to noisy input, Detection of known signals in noise, Probability of error, correlation & matched filter receiver, detection of signals with unknown phase in noise.
Estimation concepts & criteria: MLE, Estimator quality measures, Cramer Rao Bound, Wiener filter for waveform estimation, Linear prediction.

Module 2

Sampling Process: Sampling theorem, Interpolation Formula, signal space interpretation, statement of sampling theorem, Quadrature sampling of band pass signals, Reconstruction of a message process from its samples, signal distortion in sampling, practical aspects. PAM, PPM, PWM (Generation & Reconstruction), Multiplexing- TDM, FDM.
Waveform Coding Techniques: PCM, Channel noise & error probability, Quantization Noise & Signal to noise ratio, robust quantization, DPCM, Delta Modulation.

Module 3

Digital Modulation techniques: Digital modulation formats, Coherent binary modulation techniques- PSK, FSK, QPSK, MSK. Non-coherent binary modulation techniques-DPSK. Comparison of binary & quaternary modulation techniques. M-ary Mod techniques- PSK, QAM, FSK(Block level treatment only)
Base band data transmission: Discrete PAM signals, Power spectra of discrete PAM signals, Intersymbol interference, Nyquist's criterion for distortion less base band binary transmission, Eye pattern, Adaptive equalization.

Module 4

Information theory & Coding: Discrete messages, amount of information, Entropy, Information rate, Coding, Shannon's theorem, Channel capacity, Capacity of a Gaussian channel, Bandwidth-S/N Trade off, Use of orthogonal signals to attain Shannon's limit, Efficiency of orthogonal signal transmission.
Coding: Parity check bit coding for error detection, Coding for error detection and correction- Block codes- Coding & Decoding; Systematic and Non Systematic codes; Cyclic codes -Generator polynomial, Generator & parity check matrices, Encoding & decoding of cyclic codes, Syndrome computation & error detection; Convolutional coding - Code generation, Decoding- code tree, sequential decoding, State & Trellis diagrams, Viterbi algorithm; Burst error Correction: Block & Convolutional interleaving; ARQ- Types of ARQ, Performance of ARQ; Comparison of error rates in coded & uncoded system.

Text Books:

1. Simon Haykin, *Digital Communication*, John Wiley& Sons, 2005
2. Simon Haykin, *Communication Systems*, John Wiley& Sons , 2004
3. Taub & Schilling, *Principles of Communication Systems*, Tata Mc Graw Hill, 1991

Reference:

1. B.P.Lathi, *Modern Digital and analog Communication Systems*, Oxford University Press, 3rd Ed., 2005
2. Bernard Sklar,*Digital Communications Fundamentals and applications* ,Pearson edu., 2006
3. Hwei Hsu, Schaum's Outline, *Analog and Digital Communications*, McGraw Hill, 2003.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 602 MICROWAVE TECHNIQUES AND DEVICES

Module I

Introduction to microwaves - frequency range, significance, applications. Guided waves: TE,TM,TEM waves, Velocity of propagation.
Rectangular Waveguide:-TE waves, TM waves, Field configurations, Dominant mode, Degenerate mode, Impossibility of TEM.
Rectangular Cavity resonators:- Q factor-Unloaded, loaded and external Q - Coupling two cavities.

Module II

Scattering matrix -Concept of N port scattering matrix representation- Properties of S matrix- S matrix formulation of two-port junction. Microwave Passive devices - Tee junctions, Magic Tee, Rat race, Corners, bends and twists - Two hole directional coupler. Ferrite Isolator-Circulator- Phase shifter-Attenuator. S matrix of microwave components (E plane Tee, H plane Tee, Magic Tee, Directional coupler, Circulator only).

Module III

Solid state microwave devices:- Tunnel diodes –construction and working based on energy band diagrams-Applications. Principle of operation and applications of Varactor diode, Point contact diode, PIN diode Transferred Electron Devices -Gunn diode- Two valley theory , modes. Avalanche Transit time devices- IMPATT and TRAPATT devices. Comparison of GUNN, IMPATT and TRAPPAT . Basic principle of operation of parametric amplifiers, Manley Rowe power relations, Negative resistance amplifiers.

Module IV

Microwave tubes:- High frequency limitations - Principle of operation of two cavity Klystron, Reflex Klystron, Traveling Wave Tube Amplifier, Magnetron Oscillator (detailed mathematical analysis not needed), Microwave BJT structure and performance.
Microwave measurements: Measurement of wavelength, frequency, SWR, impedance, power, attenuation. Basic concepts of Network Analyzer and Anechoic chamber.

Text Books:

1. Annapurna Das and Sisir K Das, *Microwave Engineering*, Tata Mc Graw Hill ,5th reprint,2003.
2. B.Somanathan Nair, *Microwave Engineering- Theory, Analyses and Application* ,Sanguine Technical Publishers, 2005.

References:-

1. Samuel Y Liao , *Microwave Devices & Circuits*, Pearson Education, 3rd edition.
2. George Kennedy, *Electronic Communication systems*, Tata Mc Graw Hill, 4th edition.
3. Jordan and Balmain, *Electromagnetic waves and Radiating systems*, Pearson education, 2nd edition
4. John A Seeger , *Microwave theory, components and devices*, Prentice Hall.
5. C.A Balanis, *Antenna Theory- analysis and design*, John Wiley student edition ,2nd edition.
6. Pozar, *Microwave Engineering*, Wiley.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 603 VLSI DESIGN

Module I.

VLSI process integration: - fundamental considerations in IC processing - NMOS 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 :

1. Douglas A Pucknell, Kamran Eshraghian , *Basic VLSI Design*, Prentice Hall India, 2nd edition.
2. Jan M. Rabaey, A. Chandrakasan, B. Nikolic, *Digital Integrated Circuits- A Design perspective*, Pearson education, 2nd edition

References:

1. Thomas E. Dillinger , *VLSI Engineering* , Prentice Hall International editions.
2. S M Sze, *VLSI Technology*, Mc Graw Hill, 2nd edition
3. Weste and Eshraghian, *Principles of CMOS VLSI Design ,A Systems Perspective* ,Pearson Education 2nd edition.
4. Mead & Conway , *Introduction to VLSI System Design* , Addison-Wesley Publishing Co., 1980
5. Fabricius, *Introduction to VLSI Design,* McGraw-Hill, 1990
6. Charles H Roth Jr ,*Fundamentals of Logic Design* , Jaico Publishers,4th edition
7. Wolf, Modern VLSI Design, Pearson Education, 3rd edition

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC604 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Module I.

General measurement system: Static characteristics -, accuracy, precision, linearity, hysteresis, threshold, dynamic range, calibration standards. Errors – measurement of errors, error reduction.
Dynamic characteristics:-Transfer function-first and second order instruments-first and second order response – dynamic errors and dynamic compensation .Loading effect.

Module II.

Transducers and sensors: Transducers- sensors- active and passive, Temperature measurements:- RTD, Thermocouples analog and digital transducers .Review of transducers for pressure, velocity, vibration, torque, temperature. LVDT, piezo electric transducers. Impedance measurement:- dc bridges for low, medium and high resistance-ac bridges for capacitance and inductance . Sources of error in bridge circuits- precautions. Vector impedance meter, digital impedance meter. Multimeters :- Principles of analog multimeter- digital multimeter (dual slope integrations**)**

Module III.

Signal generators: - AF and RF generators- Function generator- sweep frequency generator- Frequency synthesizers.
Signal analyzers:- Wave analyzer –spectrum analyzer. Frequency and time measurement. CRO, Digital storage oscilloscope, sampling oscilloscope. Recording instruments:- self balancing system, strip chart recorders, x-y-recorders.

Module IV.

Industrial Instrumentation: Temperature measurements:- RTD, Thermocouples-different types. Radiation thermometer, Optical pyrometer. Pressure measurements: Elastic type pressure gauges. Measurement of low pressure-McLeod gauge, Ionization gauge, solid state pressure transducers. Flow measurements:- Head type flow meters, mass flow meters. Electromagnetic flow meter, laser-Doppler anemometer, and Ultra sound flow meters. Data Acquisition System:- signal conditioning , multiplexing and demultiplexing, telemetry-block diagram, characteristics and different types. Sophisticated and virtual instrumentation systems.

References: -

1. W.D. Cooper , *Modern Electronic Instrumentation and Measurement Techniques*, Prentice-Hall India
2. Bulentley, *Principles of Measurement Systems*, Pearson education,3rd edition
3. Joseph J. Carr , *Elements of Electronic Instrumentaion and Measurement* , Pearson education ,3rd edition
4. D. Patranabis ,*Principles of Industrial Instrumentation* , Tata McGraw Hill
5. C.S. Rangan, G.R. Sharma , *Instrumentation Devices and Systems* , Tata McGraw Hill
6. Beckwith, Marangoni , *Mechanical Measurements* , Pearson education ,5th edition
7. D.V.S. Murty ,*Transducers and Instrumentation* ,Prentice-Hall India
8. AL Sutllo & Jerry D, Faulk, *Industrial Instrumentation*, Thomson Learning, I edition

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/EI 605 CONTROL SYSTEM ENGINEERING

Module I.

Basic idea of control systems and their classification - differential equations of systems - linear approximation - Laplace transform and transfer function of linear system - Model of physical system (Electrical, mechanical and electromechanical)- block diagram - signal flow graph - Mason's gain formula.

Module II.

Time domain analysis - Representation of deterministic signals - First order system response - S-plane root location and transient response - impulse and step response of second order systems - performance - characteristics in the time domain - effects of derivative and integral control - steady state response - error constant - generalised definition of error coefficients - concepts of stability - Routh - Hurwitz criterion.

Module III.

Frequency domain analysis - frequency response - Bode plot, Polar plot, Nicol's chart - closed loop frequency response and frequency domain performance characteristics. Stability in frequency domain. Nyquist criterion.

Module IV.

Root locus method - basic theory and properties of root loci - procedure for the construction of root loci - complete root locus diagram. Design and compensation of feed back control system :- approaches to compensation - cascade compensation networks and their design in the frequency domain - simple design in S-plane.

Text Book:

1. Ogata K, *Modern Control Engineering*, Prentice Hall/Pearson

References:

1. Dorf , *Modern Communication Systems* ,Pearson Education
2. Franklin, *Feed back Control Systems*, Pearson Education
3. Kuo B. C, *Automatic Control System*, Prentice Hall
4. Nagoor Kani, *Control Systems*, R B P
5. Ogata, *Discrete Time Control Systems*, Pearson Education
6. Nagarath & Gopal, *Control System Engineering*, Wiley Eastern
7. Ramkayan, *Control Engineering*, Vikas Pub
8. M N Bandyopadhyaya, *Control Theory* , Prentice Hall
9. Glad , *Control Theory* , Thomson Pub

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 606 EMBEDDED SYSTEMS

Module I

Overview of Embedded System:- Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

Module II

Embedded Hardware & Software Development Environment: - Hardware Architecture, Microcontroller Architecture, Communication Interface Standards, Embedded System Development Process, Compilers and assemblers, Embedded Operating systems, Types of Embedded Operating systems.

Module III

Embedded system Design: Microchip PIC16 family, PIC16F873 processor architecture- features, memory organization, on chip peripherals, Watchdog timer, ADC, Data EEPROM, Asynchronous serial port, SPI mode, I2C mode.
Development systems and compilers for PIC micro controllers. Interfacing with LCD, ADC, sensors, stepper motor, key board, DAC. Examples for data acquisition and control

Module IV

Real Time & Database Applications: - Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications with examples like Salary Survey, Energy Meter Readings.

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Text Books :

1. *Programming for Embedded Systems*- Dreamtech Software Team, Wiley Dreamtech
2. Rajkamal, *Microcontrollers Architecture,programming,Interfacing and system Design*, Pearson Education ,2005
3. Nebojsamatic, *The PIC Microcontroller*, Mikro Elekronica

References:

1. Daniel W Lewis, *Fundamentals of Embedded Software where C and Assembly Meet*, Prentice Hall
2. *DS101374: National Semiconductor reference manual*.
3. *Embedded / RealTime systems: Concepts, Design and programming*, Dreamtech Software Team, Wiley Dreamtech
4. Barnett Cox & O'Cull , *Embedded C Programming and the Microchip PIC* , Thomson Learning, I edition
5. *1187D: Atmel semiconductor reference manual*.
6. *www.atmel.com*
7. *DS30292B: Microchip reference manual*. from *www.microchip.com*
8. Rajkamal, *Embedded Systems - Architecture, Programming and Design* , Tata McGraw Hill, 2005

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 607 COMMUNICATION LABARATORY I

PART A (compulsory)

1. Active Filters - Band Pass, Band reject (II order Butterworth)-Magnitude and phase characteristics, Q-factor.
2. Amplitude modulation - Collector and Emitter modulation schemes - measurement of modulation Indices.
3. Balanced modulator for DSB-SC signal.
4. Mixer using JFET/BJT
5. Frequency modulation using FET and VCO - Frequency deviation
6. FM generation (reactance modulator)
7. Implementation of intermediate frequency amplifier- Frequency response
8. PLL characteristics and demodulation using PLL
9. AM generation and demodulation using OP-AMPs and IC multipliers
10. SSB generation and demodulation using integrated circuits
11. AM Demodulator and Simple, Delayed and Amplified AGC
12. Time division multiplexing implementation.
13. High frequency oscillators (Any 2 from Hartely, Colpitts and Crystal oscillators)

PART B (*)

1. PAM.modulator and demodulator
2. PWM modulator and Demodulator
3. PPM modulator and Demodulator.
4. TV receiver/video system demonstration and study using demonstration kits.
5. Implementation of a communication system including a radio receiver, FM transmitter etc.

* At least two topics from part B has to be covered

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

EC608 MINI PROJECT

Each batch comprising of 3 to5 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 weightage.

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.*

CS/EB/EC/EE/EI/IT 701 INDUSTRIAL ORGANIZATION AND MANAGEMENT

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 indusial 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:

1. Fraidoon Mazda, Engineering Management-, Addison -Wesley
2. Koontz and O'Donnell, Essentials of Management, Mc Graw Hill
3. Kotlar P, Marketing Management, Prentice Hall India
4. Prsanna Chandra , Finance Management,TMH.5th ed.,
5. Monks J.G Operations Management ,MGH

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 702 RADIO COMMUNICATION

Module I

Fundamentals of Electromagnetic Radiation – Radiation Mechanism -Potential functions - Retarded potential. The Short dipole – short current element - near and far fields. Loop antenna. Basic antenna parameters -radiated power - radiation resistance - radiation efficiency - effective aperture area - radiation pattern - antenna beam width - directivity - gain - Frii's Transmission Equation

Module II

Antenna arrays:- Broad side - end fire arrays. Binomial array. Radiation pattern of two element and N-element point sources, Principle of pattern multiplication, Yagi-Uda antenna.
Microwave antennas:-rectangular aperture, circular aperture - horn antenna
Ref lector antennas:-corner-parabolic Reflector. Helical antennas (qualitative study only-construction, basic principle, pattern, gain) . Fundamentals of Microstrip patch antennas (structure, Radiation mechanism, pattern).
Antenna Measurements: - VSWR - Radiation pattern- Gain.

Module III

Propagation of radio waves:-Ground waves - Ref lection of radio waves by surface of the earth. Space wave propagation -considerations in space wave propagation- atmospheric effects, Duct propagation. Structure of Ionosphere and mechanism of ionospheric propagation- Refraction and Reflection of sky waves by ionosphere – ray paths – skip distance – virtual height-maximum usable frequency -vertical and oblique incidence.

Module IV

Introduction to RADAR:- RADAR range equation – pulse RADAR- applications of RADAR –accuracy and resolution – Doppler effect to find velocity – pulse repetition frequency – unambiguous range and velocity – factors affecting the performance of RADAR. Synthetic and Raw displays (concepts only). CW RADAR with non zero IF – FM CW RADAR - applications – MTI and Pulse Doppler RADAR
Tracking RADAR:-Sequential lobing- conical scanning- helical scanning- Monopulse tracking- SAR.(Basic concepts and Block diagrams only) Electronic counter measures – main beam jamming – side lobe jamming – passive ECM.

Text Books:

1. J.D.Kraus, R.J Marhefka and Ahmed S Khan ,*Antennas for all applications*, Tata Mc Graw Hill, 3rd edition
2. Jordan and Balmain, *Electromagnetic waves and Radiating systems*, Pearson Education, 2nd edition
3. Skolnik, , *Introduction to RADAR Systems* , McGraw Hill ,3rd edition

References:

1. C.A Balanis, *Antenna Theory, Analysis and design*, John Wiley student edition, 2nd edition
2. George Kennedy, *Electronic Communication systems*, Tata Mc Graw Hill,4th edition.
3. B.Somanathan Nair, *Microwave Engineering- Theory, Analysis and Applications*, Sanguine Technical Publishers, 2005.
4. G.S.N Raju, *Antennas and Wave Propagation*" Pearson education, 2004.
5. C.G.Christodoulou, Parveen F Wahid, *Fundamentals of Antennas: Concepts and Applications*, Prentice Hall of India.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 703 COMPUTER COMMUNICATION AND NETWORKS

Module I

Introduction to data communication: Transmission modes –serial and parallel transmission, synchronous and asynchronous, simplex, half duplex and full duplex communication. Interface standards: RS 232, RS 449, and X.21- Circuit switching and packet switching. Introduction to Computer networks: Evolution of computer networking and internet, Types of network. OSI reference model, TCP/IP reference model.

Module II

Application layer: WWW and HTTP- File transfer protocol: FTP, DNS, SMTP, SNMP, RPC

Security in Networks: Principles of cryptography- symmetric key, public key, authentication protocol, digital signature, firewall.

Module -III

Network Layer and Routing:- Network Service model – Datagram and Virtual circuit service-Routing principles-Link state routing-distant vector routing-hierarchical routing-multicast routing-IGMP Internet Protocol (IP): IPv4 addressing-routing and forwarding datagram-datagram format-datagram fragmentation- ICMP-DHCP- Network Address Translators (NATs)- IPv6 packet format-transition from IPv4 to IPv6-

Transport Layer: Transport Layer Services-Relationship between Transport Layer and Network Layer-Transport Layer in Internet-Multiplexing and De multiplexing. Connectionless Transport: UDP-Segment structure-Checksum- Connection Oriented Transport: TCP-TCP connection-TCP Segment Structure-Round trip Time estimation and Time out-Reliable Data transfer-Flow control-TCP connection Management. Congestion Control: Causes and costs of congestion- Approaches to congestion control- TCP congestion control: Fairness-TCP delay modeling.

Module IV

Link Layer and Local Area Networks: Service provided by data link layer-Error detection and correction Techniques-Elementary data link layer protocols - Sliding Window protocols - Data link layer in HDLC, Internet. Multiple Access protocols: Channel partitioning protocols: TDM-FDM-Code Division Multiple Access (CDMA) Random Access protocols : ALOHA, CSMA and CSMA/CD . Local area Network: LAN addresses- Address Resolution Protocol-Reverse Address Resolution Protocol. Ethernet: Ethernet Technologies-IEEE standards-Hubs-Bridges and Switches

Text Books:

1. James F. Kurose and Keith W. Ross, *Computer Networking – A Top-Down Approach Featuring the Internet,* 2nd edition, Pearson Education ,2003
2. F. Halsall, *Data Communication, Computer Networks and Open System*s, Addison Wesley, 1996

References:

1. Y Zheng, S Akhtar, *Networks for computer scientists and Engineers*, Oxford Press, 2004
2. S. Keshav, *An Engineering Approach to Computer Networkin*g, Pearson education ,2002
3. Uyless Black, *Computer Networks - Protocols, Standards and Interface*s, Prentice Hall India, New Delhi, 1994
4. Andrew S. Tanenbaum, *Computer Networks* , 4th edition, Pearson education, 2003
5. Behrouz A. Fourouzan ,*Data Communications and Networking,* 2nd edition ,Tata McGraw Hill,2000
6. Leon-Garcia and I. Widjaja, *Communication Network* s, Tata McGraw Hill, 2000
7. Bertsekas and Gallagar , *Data Network*s, 2nd edition, Prentice Hall India, 1992
8. Douglas Comer and David L. Stevens, *Internetworking with TCP/IP Vol. I, II, and III*,Prentice Hall, New York, 1990
9. Richard Stevens. W, *TCP/IP Utilities - Vol. I, The protocol*s, Addison Wesley, 1994
10. Sidnie Feit, *TCP/IP, Architecture, Protocols and implementatio*n, McGraw-Hill, New York, 1993

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 704 ELECTRONIC PRODUCT DESIGN

Module 1

From Requirement to Product : Engineering design as real life problem solving- Requirement analysis of Electronic products- Formulation of product requirement specifications and target specifications.

The design process: Product conceptualization- Product architecture- Product synthesis- Design analysis- Portable Electronic Design Factors-Computer Aided Design.

Representation of development tasks using standard tools showing timing and dependencies- Product Life Cycle.

Module II

Product Design and documentation: Various dimensions of Electronic Product Design- Industrial design and Engineering design- DFx methodologies in product design- Quality by design analysis- Sketches and Engineering drawing of Electronic products. Aesthetics and Ergonomics- Inputs, control and display interface.

Electronic interconnection and Packaging of components, Integrated circuits, Printed circuits and Functional products- Cables and connectors- Design, Engineering and Test Documentation – Component Specification/ Bill of materials.

Module III

Thermal Considerations in Electronic Product Design: Heat generation and modes of heat transfer in Electronic products- Selection of Power Semiconductor Devices based on thermal considerations- Selection/Design of Heat Sinks- Factors affecting the design of heat sinks and its cooling effectiveness- Assembly of components on heat sinks- Electrical analogue of thermal circuits- Enclosure design of Electronic Equipments and thermal considerations- Design guidelines for Ventilations- Forced cooling- Heat pipes for electronic cooling applications- Cooling of power intensive IC chips.

Module IV

EMI/EMC Considerations in Electronic Product Design: Sources of EMI, inter/intra system EMI- Noise performance of passive components- Cabling, Shielding and Grounding - Cables, Connectors, components and equipments for interference suppression/minimization- Intrinsic noise sources and their management- EMI standards and Regulations.

PCB design: PCB design process-Design rules for analog, digital, high-frequency, power-electronic and MW PCBs-PCB design guidelines for EM compatibility-Designing PCBs for manufacturability- Design considerations for power efficiency-Thermal Considerations in PCB design.

Introduction to SPICE simulation of circuits- Circuit description- Modeling of active and passive circuit elements - DC, AC, Transient and Parametric circuit analysis.

Module V (Tutorial Only-No questions from this module for University Examination)

Electronic Design Automation Tools: Introduction to PC based Electronic Design Automation Tools: Schematic Capture, Circuit Simulation, Layout Design etc. features like EMI analysis, Thermal analysis, 3d visualization etc. of such packages with reference to EDA tools such as Orcad, EDWIN XP etc. (As assignment, each student shall design and simulate an electronic product following the above syllabus using EDA tools.)

Reference:

1. Karl T. Ulrich & Steven D. Eppinger, *Product Design and Development,* Tata Mc Graw Hill, New Delhi, 2004
2. *Thermal Design of Electronic Equipment*- Monogram by CEDT, IISc., Bangalore.
3. Henry W. Ott, *Noise Reduction Techniques in electronic systems*, John Wiley, NY, 1988
4. Mohammed H. Rasheed, *Spice for circuits & Electronics using Pspice*, Prentice Hall India
5. V. Prasad Kodali, *Engineering Electromagnetic Compatibility-Principles, Measurements, and Technologies,* S.Chand & Company Ltd., New Delhi, 2000

6. Walter C. Bosshart, *Printed Circuit Boards- Design and Technology*, Tata Mc Graw Hill, New Delhi, 1988
7. Kim. R. Fowler, *Electronic Instrument Design*, OXFORD University Press, 2004
8. Kevin Otto, Kristin Wood, *Product Design- Techniques in Reverse Engineering and New Product Development*, Pearson Education, New Delhi, 2004
9. Richard Stillwell, *Electronic Product Design for Automated Manufacturing*, Marcel Dekker Pub
10. Bert Haskell, *Portable Electronics Product Design and Development*, Mc Graw Hill

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 705A INTELLIGENT SYSTEMS

Module I

Artificial Intelligence: History & Applications, Knowledge representation, reasoning, issues & acquisition, search techniques. Introduction to PROLOG & LISP, Expert Systems.

Module II

Artificial Neural Networks: Biological aspects, Pitt's Neuron Model, Perception model, Learning algorithm – supervised & unsupervised multilayer perception, Back propagation algorithm, Associative memory, Feed back networks, Applications of Neural Networks.

Module III

Fuzzy Systems: Fuzzy sets, Measures of fuzziness, Fuzzification, Fuzzy relations, Linguistic descriptions and their analytical forms, Defuzzification methods, Application of fuzzy logic, Fuzzy Neural Networks.

Module IV

Genetic algorithms and Evolutionary programming: Genetic algorithms – operators, working, Genetic algorithm based machine learning classifier system. Swarm Intelligent Systems: Ant Colony Systems (ACO): Biological concept, artificial systems - Applications, Particle Swarm Intelligent Systems – PCO method, Applications.

Text Book:

N.P Padhy, *Artificial Intelligence and Intelligent Systems*, Oxford University Press, 2005.

REFERENCES:

1. Rajasekharan & Pai Neural Networks, Fuzzy Logic and Generic Algorithms, PHI
2. Elaine Rich, Kevin Knight, Artificial Intelligence, Tata McGraw Hill, 2006
3. Yegnanarayana, Artificial Neural Netowrks, PHI, 1999
4. E.Cherniak, D. McDermott, Introduction to Artificial Intelligence, Addison – Wesley Pub. 1987
5. Jean – Louis Ermine, Expert Systems : Theory & Practice, PHI, 1999
6. H.J Zimmermann, Fuzzy set theory and its Applications, Kluwer Academic Publishers, 2ed., 1991

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 705B FUNDAMENTALS OF RF DESIGN

Module I

Passive Components for RF: Behavior at High Frequencies: Wire, Resistors, Capacitors, Inductors, Toroids and their winding, Impedance Transformation, Coupling of resonant circuits.
Active RF components: RF diodes, RF transistors; The Transistor at Radio Frequencies: Equivalent Circuit, Y-Parameters, S-Parameters, and other relevant two-port parameters, RF Transistor Data Sheets.
Computer-Aided Design and Analysis Interconnection of networks Analysis techniques, Optimization Use of SPICE (Practical assignments using HSPICE is recommended)

Module II

Microwave Printed Circuits & Microwave Solid State Devices: Bipolar Microwave Transistor, MESFET, MODFET/HEMT Microwave IC's, Microwave Diodes, and MODAMPs, Strip lines, Micro strips, Printed Microwave Components, Surface Acoustic Wave device.
Amplifiers: High frequency Amplifier Design, Small Signal RF Amplifier Design- Biasing, Designs using Y and S Parameters, Broadband Amplifiers, Single Stage, Multistage designs. Gain and stability analysis using S parameters. Wide Bandwidth Design Fundamental limitations on matching Transmission line transformers. Use of feedback in RF amplifier design. Design for specified gain, bandwidth, and SWR.

Module III

RF Power Amplifiers: RF Power Transistor Characteristics, Biasing, Design, Matching to Coaxial Feed lines Large Signal Amplifiers Amplifier classes and efficiency Dynamic range Inter modulation distortion Third-order intercept Design of large signal linear amplifiers. Design of large-signal class-C amplifiers Design of switch-mode amplifiers. Power combiners ,Directional couplers Hybrids.

Module IV

Oscillators and Mixers: Basic oscillator model, Oscillator, Synthesizer, Phase-locked loop, Phase noise, PLL structures & Architectures. Direct Digital Synthesis; Mixer- basic concepts, single ended, single balanced and double balanced mixers. Software Radio and DSP in Radio communication.

References:

1. Smith J, *Modern Communication Circuits*, McGraw Hill, 1986
2. Bowick, *RF Circuit Design*, H W SAMS, 1994
3. Chung & Levien, *Microwaves Made Simple: Principles & Applications*, Artech House ,1985
4. M N Radmanesh, *RF and Microwave electronics illustrated*, Pearson Education,
5. R S Carson, *High Frequency Amplifiers* ,Wiley, 1982, 2nd edition.
6. G Vendelin, *Design of amplifiers and Oscillators by the S-parameter Method*, Wiley, 1982
7. Reinhold Ludwig, Pavel Bretchko, *RF circuit Design: theory and practice*, Prentice Hall, 2000
8. Herbert L Krauss, Charles W Bostian & Frederick H Raab, *Solid State Radio Engineering,*John Wiley & Sons, 1980
9. Liao S.Y, *Microwave Devices & Circuits*, Prentice Hall , 3rd edition, 1990
10. Meyr et al, *Digital Communication Receivers, Synchronisation, Channel Estimation & Signal Processing*, Wiley, 1997.
11. Jeffrey H. Reed, *Software Radio, a modern approach to Radio Engineering*, Prentice Hall , 2002

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 705C HARDWARE MODELING

Module I

Introduction: Hardware Abstraction- Basic Terminology- Entity Declaration- Architecture Body- Configuration Declaration- Package Declaration- Package Body- Model Analysis- Simulation- Basic Language Elements – Identifiers- Data Objects- Data Types- Operators. Example designs: Basic Combinational Circuits.

Module II

Behavioural Modelling: Entity Declaration- Architecture Body-Process Statement- Variable Assignment Statement- Signal Assignment Statement- Wait Statement- If Statement - Case Statement- Null Statement- Loop Statement- Exit Statement- Next Statement- Assertion Statement- Report Statement- Other Sequential Statements- Multiple Processes- Postponed Processes - Dataflow Modelling: Concurrent Signal Assignment Statement- Concurrent versus Sequential Signal Assignment- Delta Delay Revisited- Multiple Drivers- Conditional Signal Assignment Statement- Selected Signal Assignment Statement- the UNAFFECTED Value- Block Statement- Concurrent Assertion Statement- Value of a Signal. Modelling Basic Binary Arithmetic Circuits, Sequential Circuits, Registers.

Module III

Structural Modelling: Component Declaration- Component Instantiation- Resolving Signal Values - Generics and Configurations: Generics- Configurations- Configuration Specification- Configuration Declaration- Default Rules - Conversion Functions - Direct Instantiation- Incremental Binding. Subprograms and Overloading: Subprograms- Subprogram Overloading- Operator Overloading- Signatures- Default Values for Parameters - Packages and Libraries. Models of RAM, Dual-Port RAM, and FIFO.

Module IV

Advanced Features: Entity Statements- Generate Statements- Aliases- Qualified Expressions- Type Conversions- Guarded Signals- Attributes- Aggregate Targets- Shared Variables- Groups - Model Simulation: Simulation- Writing a Test Bench- Converting Real and Integer to Time- Dumping Results into a Text Fi1e- Reading Vectors from a Text File- A Test Bench Example- Initialising a Memory- Variable File Names- Hardware Modelling Examples: Modelling Entity interfaces- Modelling Simple Elements- - Different Styles of Modelling- Modelling Regular Structures- Modelling Delays- Modelling Conditional Operations- Modelling Synchronous Logic- State Machine Modelling- Interacting State Machines- Modelling a Moore FSM- Modelling a Mealy FSM.

Text Book:

1. J. Bhasker, *VHDL Primer*, Pearson Education Asia, 3rd edition.

Reference:

1. Sudhakar Yakmandhiri , *Introducing VHDL from simulation to synthesis*, Pearson Education Asia
2. Stephen Brown and Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, Mc-Graw-Hill ,2nd edition
3. K. C. Chang, *Digital Design and Modeling with VHDL and Synthesis* , IEEE Computer Society Press, I edition
4. Charles H.Roth Jr., *Digital Systems Design Using VHDL*, Thomson Learning, 2006

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EB/EC/EI 705D MECHATRONICS

Module I

Introduction to Mechatronics- Elements of Mechatronic Systems.
Sensory System: Sensors & Transducers- Performance measure, static and dynamic characteristics- Sensing displacement, position, proximity, velocity and motion, force, pressure, flow, level, range, temperature and Light.
Signal Conditioning and Date Acquisition: Signal Conditioning Elements- amplification, attenuation, impedance matching, linearization, digitization, level shifting, filtering, error compensation, etc. Data acquisition and presentation in mechatronic systems- signal measurement and calibration- Design Considerations

Module II

Actuation System: *Pneumatic & Hydraulic Systems*: Process Control Valves, Directional and Pressure Control valves, Linear and Rotary actuators.
Mechanical Actuation Systems: Translational and Rotational motions, Kinematic Chains, Cams, Gear Trains, Ratchet and Pawl, Belt and Chain drives, Bearings.
Electrical Actuation Systems: Mechanical and Solid State Relays, Solenoids, DC & AC motors, Servo & Stepper motors- Specifications and Selection considerations.
Power sources for mechatronic Systems

Module III

Mathematical modeling of Engineering Systems: System Building blocks for Mechanical, Electrical, Fluid and Thermal systems.
General Engineering System Modeling: Rotational_Translational, Electromechanical, Hydraulic_Mechanical systems- System Transfer Function- Dynamic response of systems for standard test signals (Detailed mathematical analysis not required).
MEMS: Internal Structure, advantages, manufacturing, applications- Fibre Optic Devices in Mechatronics
(For this module assignments on Simulation studies using computer software such as MATLAB with SIMULINK is recommended)

Module IV

Mechatronic System Controllers: ON/OFF, P, I, D, PI and PID Controllers, Digital controllers, Intelligent Controllers in Mechatronics.
Programmable Logic Controllers: Structure, I/O processing, Programming, applications – Selection Criteria.
Typical Mechatronic Systems: Robotic Systems, CNC machines, FMC, FMS, AGV etc.

Text Books:

1. Bulton. N, *Mechatronics- Electronic Control systems in Mechanical and Electrical Engineering*, Pearson Education, 2006
2. Devadas Shetty, *Richard A. Kolk, Mechatronics System Design*, Thomson, New Delhi, 2007
3. S. R. Deb, *Robotics Technology and Flexible Automation*, Tata Mc Graw Hill, New Delhi, 2004

References:

1. M.D. Singh, J.G. Joshi, *Mechatronics*, Prentice Hall India, New Delhi, 2006
2. Dradly. D.A, Dawson.D, Burd N.C and Loader A.J, *Mechatronics – Electronics in Products & Processes*, Chapmen & Hail, 1993.
3. *Mechatronics*, HMT Limited, Tata McGraw Hill, 1998.
4. James Harter, *Electromechanics- Principles concept and Devices,* Prentice Hall, 1995.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC /EI 706 SIGNAL PROCESSING LABORATORY

1. Familiarization of Signal processing tool box-MATLAB
2. Familiarization of DSP trainer kit (Sampling & reconstruction of signals)

List of experiments to be implemented

1. Generation of basic input signals (both discrete & continuous)
2. DFT and spectral analysis computation of DFT, properties of DFT
3. Convolution
4. Correlation
5. Digital filter design- FIR & IIR Filters
6. FFT
7. Spectral estimation

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

EC 707 COMMUNICATION LABORATORY II

PART A (compulsory)

1. Sampling and reconstruction of signals
2. PCM generation
3. Differential PCM generation
4. Implementation of Delta modulator and demodulator
5. Matched filter receiver for rectangular pulse
6. Generation and detection of BASK and BFSK signals
7. Generation and detection of BPSK signals
8. Generation and detection of QAM using IC multipliers
9. Microwave Communication (Any 2 Experiments from)
   (a) Study of Klystron source-Power, mode and impedance, SWR, guide wave length
   (b) Gunn Source-Characteristics, Hybrid T, Directional coupler, Circulator
   (c) FET M/W source-SWR, Impedance, Guide wavelength, Tees
   (d) Study of Microwave links
10. Antenna characteristics- Radiation pattern and beam width, gain measurements.

PART B (*)

1. Communication system simulation using software tools
2. DAS using Microprocessors
3. Experiments on Computer communication
4. Development of an optical fiber communication transmitter and receiver module.
5. A small project work using ANN, image processing or biomedical instrumentation.

* At least two topics from part B has to be covered

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

EC 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 of3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.

EC 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.*

EC 801 AUDIO & VIDEO ENGINEERING

Module I

Audio Engineering: Sound waves, Complex sounds, Audio frequency range, loudness, pitch, and decibels. Sound pick up devices (microphones): types: - condenser- carbon, piezoelectric – direction pattern-parameters of microphones: - frequency range- sensitivity-impedance- noise. Sound reproduction devices: types: - horn, cone – typical specifications- Acoustics of speech production and hearing. Recording of Sound: Magnetic recording systems –optical storage systems-Coding and decoding applied to CD – CD-R

Module II

Video Engineering: Elements of Television System:- Basic Block Schematic of Monochrome TV Transmitter and receiver, Gross structure, flicker& interlaced scanning ,number of scanning lines. Horizontal and Vertical resolution, Resolution and Bandwidth. Composite video signal- Vertical and horizontal synchronization, Vestigial Sideband Transmission, transmission of Sound signal. Modulation Positive and Negative Modulation and its comparison - Picture tubes. Television Cameras, Working Principle and operation of CCD cameras,

Module III

Colour Television: Compatibility considerations, Colour response of human eye, three colour theory, additive mixing of colours, chromaticity diagram, Luminance and chrominance, Block schematic explanation of Colour TV Cameras. Colour difference signal and its generation. Colour signal transmission, Modulation of colour Difference signals and colour burst signal. Basic Colour Television Systems: PAL, NTSC and SECAM.-Block Schematic, explanation and Comparison. Colour TV picture tubes: CRTs, LCD and Plasma displays.

Module IV

Audio and Video coding: Introduction to Audio Coding, Audio compression, MPEG – Block diagram of audio encoder and decoder, Digital Audio Broadcasting- Block schematic explanation.
Video coding and compression: Need for compression- video image representation – quantization of image data-intra frame compression techniques: DPCM –DCT based transform coding- Motion Compensation –H261 video conference coding standard-MPEG video compression- HDTV- DVB-T

Text Books:

1. *The Electronics Hand Book* edited by JC Whitaker ,IEEE Press
2. RR Gulati, *Monochrome and Colour Television*, New Asian Age
3. Fred Halsal , *Multimedia Communications* ,Pearson Education
4. Thomas Quatieri , *Discrete Time Speech Signal Processing: Principles and practice* , Pearson Education

References:

1. Kinsler , Frey, Coppens, *Fundamentals of Acoustics* , Wiley Eastern, 4th edition
2. Bernad Grob, *Basic Television Engineering*, Mcgraw hill
3. A M Dhake , *Television and Video Engineering* ,McGraw hill
4. S P Bali , *Colour Television* , New Age International Publishers
5. Whitaker, Jerry, *Mastering Digital Television: The Complete Guide to the DTV Conversion* ,McGraw Hill

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 802 COMMUNICATION SYSTEMS

Module 1

Microwave Communication : Basic principles of microwave links- Microwave Relay Systems – Choice of frequency – line of sight and over the horizon systems – modulation methods – block schematics of terminal transmitters and receivers – microwave repeaters – microwave repeaters – microwave repeaters – microwave antennas – propagation mechanisms – propagation characteristics – path loss models – shadowing models – small scale fading and multipath fading – basic principles of design of microwave link

Module II

Satellite Communication – Orbit of communication satellite – Satellite Constellation – Orbital parameters – Orbital perturbations – Geostationary orbits – Low Earth and Medium Orbits – Look Angles – Frequency selection RF Links – Propagation characteristics – Modulation methods- coding – multiple access – space craft – antennas – transponders – intersatellite link – link power budget – earth station interference – Satellite systems – Geostationary systems – Distress and Safety systems – Navigation systems – direct sound broadcast systems – Direct Television broadcast systems

Module III

Spread system Communication: General concepts – Direct Sequence spread spectrum – frequency hopping – transmitter and receiver – time hopping – Antijam consideration – CDMA
Telemetry and Remote Sensing : Definition of telemetry – different types – Applications – Image characteristics – Contrast Ratio – Spatial Resolution – Resolving Power – brightness – tones etc. – Remote Sensing Systems – Framing systems – Scanning systems – characteristics of aerial photographs – spatial and ground resolution – relief displacement etc – IR detection and imaging – IR image characteristics – Applications of Remote Sensing.

Module IV

Wireless communication systems: Cellular concepts – Cell Splitting and Frequency Reuse - Propagation Mechanisms – Modulation techniques for wireless communication – Analog, Digital and Spread Spectrum modulation – Equalisation, Diversity and Channel coding Diversity Techniques – Multiple access techniques for Wireless Commuications – FDMA,TDMA and CDMA – Wireless systems and standards – AMPS – Global System for Mobile(GSM) – CDMA – General Packet Radio Service – DECT System .

References :

1. T.S. Rappaport, *Wireless Digital Communications : Principles and Practice* , Pearson Education/ Prentice Hall, NJ, 1996
2. Schiller, *Mobile Communications* , Pearson Education
3. Dennis Roddy, *Satellite Communications*, Prentice Hall
4. WL Prichard , *Satellite Comunication Systems Engineering*, Pearson Education
5. A Grarwal and An Zeng ,*Introduction to wireless and Mobile systems* , Thomson Learning
6. B P Lathi ,*Analog and Digital Communication* ,Oxford University Press
7. Floyd F Sabins, *Remote Sensing Principle and Interpretation*, WH Freeman & C, New York
8. Dr. B C Panda, *Remote Sensing Principles and Applications*, Viva Books Private Ltd.,2005
9. D. Muples and M Rehharia, *Mobile Satellite Communication,* Pearson Education
10. K Foher , *Wireless digital Communications* , Prentice Hall, NewDelhi,1995
11. Blake, *Wireless Communication Technology*, Thomson Publishers, I edition

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 803 OPTO ELECTRONICS AND COMMUNICATION

Module 1

Nature of light, optical laws, optical fiber –ray analysis –wave propagation in di-electric slab wave guide – mode theory of optical fiber – multi mode and signal mode fibers – graded index fiber –NA-fabrication of optical fibers-specification of optical fiber – attenuation characteristics-dispersion- types-effect on bandwidth- dispersion shifted and polarization maintaining fiber.

Module II

Optical sources-direct and indirect band gap materials-LED structures- quantum efficiency- modulation.
Laser diodes- rate equations- diode structure- single mode laser-modulation- temperature effects- quantum cascade lasers-vertical cavity surface emitting lasers- modal noise- partition noise- reflection noise. Photo detectors-PIN, APD, Photo detector noise - response time- structure of detectors- receiver units.

Module III

Light coupling-source to fiber coupling, fiber splices- fiber to fiber coupling-effect of mis-alignment-coherent detection-transceivers for fiber optic communication. Pre amplifier types-optical receiver performance calculation-noise effects-receiver modules: - Analog communication link - link power budget, rise time budget.
Optical spectrum analyzer- Applications-Measurement of attenuation-Cut back technique-Insertion Loss method, OTDR, Dispersion measurement for chromatic, polarization mode and intermodal dispersion. Eye patterns.

Module 1V

Components of fiber optic networks: – couplers - splitters- semiconductor optical amplifiers- Erbium doped fiber amplifiers- wavelength division multiplexers/ demultiplexers. Filters- isolators-circulators-optical switches-Wavelength converters- Fiber gratings tunable sources-tunable filters.
Optical networks:- SONET/ SDH, DWDM, Optical CDMA, FDDI, performance of various systems.

Text Book:

1. Gerd Kaiser , *Optical fiber communication*, Mc Graw Hill, 3rd edition.

Reference s:

1. John Gowar, *Optical communication systems* , Prentice Hall
2. Mynbaev and Scheiner , *Fiber optic communications technology*,Pearson education
3. Selvarajan, Kar and Srinivas, *Optical Fiber communications*, Tata Mc Graw Hill
4. John M. Senior, *Optical fiber Communication*, Prentice Hall

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EC/EE/EI 804 A DIGITAL IMAGE PROCESSING

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

Image compression: fundamentals- redundancy: coding, inter pixel, psycho visual, fidelity criteria, Models, Elements of information theory, Error free compression- variable length, bit plane, lossless predictive, Lossy compression- lossy predictive, transform coding. Fundamentals of JPEG, MPEG, Fractals.

Text Book:

1. Gonzalez and Woods, *Digital Image Processing*, Pearson Education, 2002.

References:

1. Anil K. Jain ,*Fundamentals of Digital Image Processing*, Pearson Education, 2003.
2. Mark Nelson, Jean-Loup Gailly ,*The Data compression Book*, BPB Publications, 2nd edition.
3. Pratt William K.,*Digital Image Processing*, John Wiley & sons
4. Chanda & Majumdar, *Digital Image Processing and Analysis* , Prentice Hall ,3rd edition
5 M.Sonka,V. Hlavac, R. Boyle, *Image Processing, Analysis and Machine Vision*, Thomson Learning,2006

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/IT 804 B BIOINFORMATICS

Module I

Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, Genomes and Genes - Genetic code, Transcription, Translation and Protein synthesis. Web based genomic and proteomic data bases: NCBI, GenBank

Module II

Sequence alignments – Dot plot-Pair-wise sequence alignments - local and global -Sequence similarity and distance measures - Smith-Waterman algorithm, Needleman-Wunch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments – PAM and BLOSUM, Phylogenetic analysis

Module III

Informational view of Genomic data, Genomic Signal Processing, DNA Spectrograms, Identification of protein coding regions, Gene expression, Microarrays, Microarray image analysis

Module IV

Gene structure in Prokaryotes and Eukaryotes: Molecular Structure Prediction: Basic concepts and terminologies related to molecular structures, Basic molecular Visualization, RNA secondary structure prediction, Protein folding problem, Protein Threading, Protein Visualization, Introduction to Drug Discovery.

Case Study

Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

Text Books:

1. Setubal & Meidanis, *Introduction to Computational Molecular Biology*, Thomson:Brooks/Cole, International Student Edition, 2003
2. Claverie & Notredame, *Bioinformatics - A Beginners Guide*, Wiley-Dreamtech India Pvt Ltd, 2003.

References:

1. Lesk, *Introduction to Bioinformatics*, Oxford University Press, Indian Edition, 2003
2. Higgins and Taylor, *Bioinformatics: Sequence, structure and databanks*, Oxford University Press, Indian Edition, 2003
3. Bergeron, *Bioinformatics Computing*, Prentice hall of India, 2003
4. Jiang, Xu and Zhang, *Current topics in Computational Molecular Biology*, Ane Books, New Delhi, 2004
5. S.C Rastogi & Namitha Mendiratta, *Bioinformatics method and application Genomics,Protinomics & drug discovery*
6. Dov Stekel, *Microarray Bioinformatics* ,Cambridge University Press

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 804C ASIC DESIGN

Module I

Introduction to ASICs: - Types of ASICs - Design flow - Combinational Logic Cell -Sequential logic cell - Data path logic cell – I/O cells .Transistors as Resistors - Transistor Parasitic Capacitance-Logical effort.

Module II

Programmable ASICs: - Anti fuse - static RAM - EPROM and EEPROM technology – practical issues - Programmable ASIC logic cells : Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX.
Programmable ASIC I/O cells : DC & AC inputs and outputs - Clock & Power inputs .

Module III

Programmable ASIC interconnect: Actel ACT -Xilinx LCA - Altera MAX 5000 and 7000 –
Testing: Importance, Faults, Fault models, physical faults, Stuck at fault model, Logical faults, Fault collapsing, Fault simulation – serial fault simulation, parallel fault simulation, concurrent fault simulation, nondeterministic fault simulation, ATPG-D-Calculus, Basic ATPG algorithm, PODEM algorithm, controllability, observability.

Module IV

ASIC construction: System partition - FPGA partitioning - partitioning methods – Popular algorithms Floor planning and placement: physical design flow- algorithms. Routing : global routing - detailed routing - special routing - circuit extraction - DRC.

Text book:

1. M.J.S .Smith, *Application Specific Integrated Circuits* , Pearson Education ,1997.

References:

1. Andrew Brown, *VLSI Circuits and Systems in Silicon* , McGraw Hill, 1991.
2. S.D. Brown, R.J. Francis, J. Rox, Z.G. Uranesic, *Field Programmable Gate Arrays,* Kluever Academic Publishers, 1992.
3. Mohammed Ismail and Terri Fiez, *Analog VLSI Signal and Information Processing*, McGraw Hill, 1994.
4. S. Y. Kung, H. J. Whilo House, T. Kailath, *VLSI and Modern Signal Processing* , Prentice Hall, 1985.
5. Jose E. France, Yannis Tsividis, *Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing*, Prentice Hall, 1994.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 804D MIXED SIGNAL SYSTEM DESIGN

Module I

Basic current mirrors and single-stage amplifiers : simple CMOS current mirror, common-source amplifier, source-follower or common-drain amplifier, common-gate amplifier, source-degenerated current mirrors, high output impedance current mirrors, cascode gain stage, MOS differential pair and gain stage. Basic Opamp Design and Compensation – Two-stage CMOS opamp, Feedback and Opamp Compensation. Advanced Current Mirrors and Opamps – Folded-Cascode Opamp, Current Mirror Opamp, Fully Differential Opamps, Common-Mode Feedback Circuits, Current-Feedback Opamps.

Module II

Comparators using Opamp:- Charge-Injection Errors, Latched Comparators, Examples of CMOS comparators. Sample-and-Hold Circuits, MOS Sample-and-Hold Basics, Examples of CMOS S/H Circuits, Band-Gap Reference Voltage, Switched-Capacitor circuits – Basic building blocks, operation and analysis, Charge Injection, Switched-Capacitor Gain Circuits, Correlated Double Sampling techniques.

Module III

Data Converter Fundamentals: Nyquist-rate D/A and A/D Converters, Oversampling Converters with and without noise shaping, Sigma-delta A/D converters, Higher-order modulators, MASH architecture, band-pass oversampling converters, multi-bit oversampling converters, Continuous-time filters.

Module IV

Analog Layout considerations:, CMOS Layout and design rules, Layout of integrated resistors, capacitors and analog switches.

Text Book:

1. David A. Johns, Ken Martin, *Analog integrated circuit design*, Wiley & Sons, Inc., 1997.

References:

1. Mohammed Ismail, Terri Fiez, *Analog VLSI signal and information processing*, McGraw-Hill, 1994.
2. Philip E. Allen, Douglas R. Hollberg, *CMOS analog circuit design*, Oxford University Press, 2002.
3. Behzad Razavi, *Design of analog CMOS integrated circuits*, McGraw-Hill, 2001
4. Paul R. Gray, Robert G. Meyer, *Analysis and design of analog integrated circuits*, Wiley & Sons, Inc.,4th edition, 2001.
5. Behzad Razavi, *Principles of data conversion system design*, IEEE Press, 1995

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 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.*

EC 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.