ELECTRONICS AND INSTRUMENTATION ENGINEERING

SYLLABUS (2006 ADMISSION ONWARDS)

SCHEME FOR I TO VIII SEMESTERS

B.TECH ELECTRONICS & INSTRUMENTATION ENGINEERING

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

Semester I&II (Common to all branches)

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

*1hour/week for environmental studies

Semester III

Course Code	Subject Name	Hrs /Week		Marks		
		L	T/D/P	Internal	University	Total

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 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/EI304	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	BasicElectronics Laboratory	-	3	100		100
EB/EC/EI 308	Electrical Machines Laboratory	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester IV

Course Code	Subject Name	Hrs /Week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 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
EI 405	Principles of Measurement and Instrumentation	4		50	100	150
EB/EC/EE/EI 406	Industrial and Power Electronics	4		50	100	150
CS/EB/EC/EE/EI 407	DigitalElectronics Laboratory	-	3	100		100
EI 408	ElectronicCircuits Laboratory	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester V

Course Code	Subject Name	Hrs /Week		Marks		
		L	T/D/P	Internal	University	Total

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 501	Engineering Mathematics IV	4		50	100	150
EI 502	Industrial Instrumentation I	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
EI 508	Instrumentation Laboratory I	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester VI

Course Code	Subject Name	Hrs /Week		Marks		
		L	T/D/P	Internal	University	Total
EI 601	Communication Engineering	4		50	100	150
EI 602	Process Control Instrumentaion I	4		50	100	150
EC/EI 603	VLSI Design	4		50	100	150
EI 604	Industrial Instrumentation II	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
EI 607	Instrumentation Laboratory II	-	3	100		100
EI 608	Mini Project	-	3	100		100
	Total	**24**	**6**	**500**	**600**	**1100**

Semester VII

Course 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
EI 702	Process Control Instrumentation II	4		50	100	150
EC/EI 703	Computer Commucation.& Networks	4		50	100	150
EI 704	Analytical Instrumentation	4		50	100	150
EI 705	Elective I	4		50	100	150
EC/EI 706	Signal Processing Laboratory	-	3	100		100
EI 707	Process Control Laboratory	-	3	100		100
EI 708	Seminar	-	2	50		50
EI 709	Project Design	-	2	50		50
	Total	**20**	**10**	**550**	**500**	**1050**

ELECTIVE I

EC/EI 705A : Intelligent Systems

EI 705B : Telemetry and Remote Control

EI 705C : Power Plant Instrumentation

EB/EC/EI 705D : Mechatronics

EI 705E : Artificial Intelligence and Expert Systems

Semester VIII

Course Code	Subject Name	Hrs /Week		Marks		
		L	T/D/P	Internal	University	Total
EI 801	Instrumentation System Design	4		50	100	150
EI 802	Biomedical Instrumentation	4		50	100	150
EI 803	Optoelectronic Instrumentation	4		50	100	150
EI 804	Elective II	4		50	100	150
EI 805	Project Work		14	300		300

EI 806	Viva -Voce				100	100
Total		**16**	**14**	**500**	**500**	**1000**
Grand Total				**3700**	**4300**	**8000**

ELECTIVE II

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

EI 804B : Advanced Analytical Techniques

EC/EI 804C : ASIC Design

EI 804 D: Audio and Video Systems

EI 804E : Advanced Biomedical Instruments

SEMESTER I&II

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 101 ENGINEEERING MATHEMATICS I

MODULE I

Ordinary differential equations : First order differential equations – methods of solution and simple application – 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 syatems.

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 test)

Power series : Internal of convergence of power series, Taylor and Maclaurin series of functions, Leibniz formulae 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, Taylor 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, Application of multiple integrals Plane Area, Surface area and Volumes of solids.

TEXT BOOKS:

1. Engineering Mathematics –Vol I , 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
3. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 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 cavity – 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 – Application 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 – Application 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 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 function – artificial radio activity – 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 X9rays – 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 – application of semiconductors – P-N junctions – solar cells- Hall effect and its applications – Superconductivity – superconducting transition – Meissner effect – Type I and Type II superconductors – Isotope effect – high temperature superconductors – Josephson effect – SQUIDS – application of superconductors.

TEXT AND REFERENCE BOOKS :

1. Jacob Phillip, Atext 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 Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 103 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 charecterisation, 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, over voltage, 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 unimolicular and bimolecular reactions, Arrhenius equation, fast reaction, flash photolysis, flow techniques and relaxation methods.

MODULE III

Chemical Thermodynamics : fundamentals, molecular interpretation of internal energy, enthalpy and entropy, heat of reaction, Kirchoff'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 processing methods (extrusion, injection, compression, transfer and blow molding methods) Nanomaterials : definition, classification and application, nanometals and nanoceramics, examples and properties.

Lubricants: classification function and properties, mechanism of lubrication

Refractories: classification and properties, Portland cement, lime and plaster of Paris – manufacture, setting and hardening

Chemistry of optical fibers, fullerenes and organoelectronic materials (introduction only)

TEXT BOOKS:

1. Pete Atkins and Julio de Paula, Elements of Physical Chemistry, Oxford University Press
2. Shashi Chawla, A Text Book of Engineering Chemistry (3 ed), 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, Delhi, 1999
3. Geoffrey Ozin, Andre Arsenault, Nanochemistry: A Chemical Approach to Nanomaterials, Royal Society of Chemistry, UK, 2005

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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

A) STATICS

MODULE I
Concurrent force sin a plane : principles of statistics, 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, methods 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'Alembert's principle of rotation, resultant inertia force in rotation, principle of angular momentum in rotation, energy equation for rotating bodies.

TEXT BOOK AND 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

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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

MODULE I

Introduction to engineering graphics : Drawing instruments and their use, familiarization 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 to perpendicular to other plane – projection of solids with axis inclined to both the planes – projection of solids in 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.Khataria & sons Ludhiana
4. Engineering Graphics, P.I.Varghese, VIP Publishers.

Type of Questions for University Exam.

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

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 106 BASIC CIVIL AND MECHANICAL ENGINEERING

A) CIVIL ENGINEERING

MODULE I

Materials: Cement – varieties and grade of cement and its uses, Steel – types of steel for reinforcement bars, steel structure 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 foundation – isolated footing, combined footing, raft, pile and 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 Enginneering, 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 syatems, 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 carburetor, ignition system, fuel pump, fuel injector, cooling system, lubricating system.
Transmission of power: Belt drives (open & 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
4. Thermodynamics, J.P.Holman
5. Elements of Internal Combustion Engines, Rogowsky, Tata McGraw Hill
6. Fundamentals of Internal Combustion Engines, Gill, Smith & Ziurys, Oxford & IBH
7. Refrigeration and Air Conditioning, Stoecker, Tata McGraw Hill

Type of Questions for University Exam.

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/FT 107 BASIC ELECTRICAL ENGINEERING & ELECTRONICS

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 – Thevinin's theorem – Superposition theorem – Norten'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 and extrinsic semiconductors, doping, PN junction – diodes – Zener diodes – characteristics – application of diodes, Rectifiers – half wave, full wave and bridge rectifiers – ripple factor and regulation

Transistors : PNP & 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 BOOKS :

1. Basic Electronics – solid State, B.L.Theraja, S.Chand & Co

2. Fundamentals of Electrical Engineering, Leonard.S.Bobrow, Oxford University Press

REFERENCES :

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

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CE/CS/EB/EC/EE/E1/IT/ME/SE 108 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

CE/CSIEBIECIEEIEI/MEIIT/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; shon 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 repon; 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 modem civilization. The philosophy of modem sciencescientific detenninism - uncenainity principle. Relevance of scientific temper. Science and religion. Science and technology in developing nations. Technological advances of modem 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 vinues - Attributes of an ethical personality - Theories about right action - Self interest.

Responsibilities and Rights of engineers - Collegiality and Loyalty - Respect for authority - Collective bargainingConfidentiality - 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 Shanna : 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.

Adrian Doff & Christopher Jones, References:
Language in Use. Upper intermediate, self-study workbook & classroom book, Cambridge University Press,2000

Krishna Mohan & Meenakshi Raman,	Effective English Communication ,Tata Mc-Graw HiII,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 KoriahaIli	Essentials of business communication, S. Chand & Company Ltd
Sarah F'reeman,	Study Strategies, Orient Longman, 1978.
Meenambal T , Uma R M and K MuraU	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

Q1- 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 QIII-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

QII- 2 questions A and B of 10 marks from module III with choice to answer anyone

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/IT/ME/SE/FT 110 COMPUTER PROGRAMMING LABORATORY

1. Study of OS commands. General introduction to application packages
2. Programming using C control structures and pointers
3. Searching & Sorting
4. Creation and use of databases in suitable database package
5. 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/IT/ME/SE/FT 111 ELECTRICAL AND MECHANICAL WORKSHOPS

ELECTRICAL WORKSHOP

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

MECHANICAL WORKSHOP

1. Fitting shop
2. Sheet Metal shop
3. Foundry shop
4. Welding shop
5. Carpentry shop

(Preliminary exercises for beginners in all shops. Specific models may be designed by the teachers)

Introduction to the use of concrete mix.

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.

SEMESTER III

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 301 ENGINEEERING 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 2 π, 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 scalar point functions – Divergence and curl of vector point functions – their physical meanings, Evaluation of line integral, surface integral and volume integrals, Gauss's divergence theorem, Stock'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 foe 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 Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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, principle 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, 7th ed, Khanna Publications

REFERENCES :

1. B.L.Thereja, Electical Machines, vol I & IV, 23rd ed, Khanna Publishers
2. H.Cotton, Advanced Electrical Technology, 6th ed, , Wheeler Publications
3. Nagarath & Kothari, Electrical Machines, 3rd ed, Tata McGraw Hill

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 zeroes, application of Laplace transforms – solution of network problems.

MODULE III

Passive filters – filter fundamentals, Classification of filters – Low pass, High pass, Band p[ass & Band reject filters, Characteristic impedance, Design of constant K and m drived filters (all four) – T and π – frequency response, Recursive filters – Butter worth, Chebychev & 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- λ/8, λ/4 and λ/2 lines, Losses in transmission lines, Smith chart and applications, Impedance matching- Single stub and double stub properties.

TEXT BOOKS

1. D.Roy Choudhury, Networks and systems, New Age International,1988
2. A. Sudhaker and Shyam Mohan.S.Pillai, Circuits and Networks: Analysis and Synthesis, Tata McGraw Hill
3. Ryder, Network Lines and Fields, Prentice Hall India, 3 edition
4. G.S.N.Raju, Electromagnetic Theory and Transmission Lines, IK International, 2006

REFERENCES

1. Wiliam.B.Stanley, Network Analysis with applications, Pearson Education, 4th ed
2. C.P.Kuriakose, Circuit Theory : Continuous and Discrete- time systems, Elements of network synthesis, PHI, 2005
3. A.Usha Nandini and A.Aravamudan, Network Theory, Scitech Publishers,2004
4. Dr.D.Ganesh Rao and R.V.Srinivasa Murthy, Network Analysis – a simplified approach, Sanguine Publishers, 2005
5. Bruce Carlson, Circuits, Thomson Learning, 2006

6. Boylestead, Introductory Circuit Analysis, 5th ed, UBS, 2003
7. Decarlo/ Lin, Linear Circuit Analysis, Oxford University Press, 2005
8. Schaum's 3000 solved problems in Electric Circuits, Book 1,2, McGraw Hill, 1988

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EB/EC/EI 304 DIGITAL ELECTRONICS

MODULE I

Number systems 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, realization 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,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 BOOKS :

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

REFERENCES :

1. J.M.Yarbrough, digital Logic, Applications & Design, Thomson Learning, 1997
2. Flyod & Jain, Digital Fundamentals, Parson Education, 8th ed
3. R.P.Jain, Modern Digital Electronics, Tata McGraw Hill, 3rd ed
4. R.K.Gaur,Digital Electronics and Microcomputers, Dhanpat Rai and Sons, 3rd ed
5. Taub & Schilling, Digital Integrated Electronics, Mc Graw Hill, 1985
6. Malvino and Leach, Digital Principles and Applications, Mc Graw Hill 5th ed
7. Charles.H.Roth, Fundamentals of Logic Design, Thomson Learning, 5th ed
8. J.M.Yarbrough, digital Logic, Applications & Design, Thomson Learning, 2006

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 305 SOLID STATE ELECTRONICS

MODULE I

Band theory of solids : conductors, semiconductors and insulators – energy band diagram – semiconductor materials and their properties : elemental semiconductors – energy band model of semiconductors, valence 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 semiconductors – drift of carriers in electric fields, carrier flow by diffusion – constancy of Fermi level across junction, excess carriers in semiconductors – injection 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 condition in active region – solution for short base width – base width modulation – Transistor configurations – characteristics – current amplification factors – relations between alpha and 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/Prentice Hall India Ltd, 6 ed
2 Suresh Babu, Solid State Devices and Technology, Sanguine Tech Publishers

REFERENCES :

1..Electronic Devices, Learning Material Series, ISTE, New Delhi, 1997
2. Millman & Halkais, Electronic Devices & Circuits, Mc Graw Hill, 2004
3. George B Rutkowski, Solid state Electronics, Mc Graw Hill, 4th ed
4. S.S.Islam, Semiconductor Physics & Devices, Oxford University Press,2006
5. Dr.Achuth & Dr.K.N.Bhatt, Solid State Devices,Tata Mc Graw Hill

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 regulator – 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 – DC coupled amplifier – CE RC coupled amplifier – concept of load lines – loading effect at input and out put - 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 RC coupled amplifier – low frequency 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 voltage variable resistor – comparison of FET with BJT, CMOS biasing – amplifier circuits – 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, multiivibrators using transistors – astable.monostable and bistable operation.

TEXT BOOKS :

1. Boylsted & Nashelsky, Electronic Devices and Circuits, Pearson Education/ Phi Ltd, 9 ed
2. Bogart, Electronic devices and Circuits, Pearson Education 6 ed
3. Millman & Taub, Pulse Digital & Switching waveforms, Tata McGrawHill ,2002

REFERENCES:

1. Milman & Halkais, Integrated Electronics, Tata McGraw Hill, 2003
2. Sedra & Smith, Micro electronic Circuits, Oxford University Press, 5 ed
3. Schilling & Belove, Electronic Circuits, Discrete & Integrated, Tata McGraw Hill, 3 ed
4. 2000 solved problems in Eelectroics: Schaum series, McGraw Hill,1990
5. Allen Mottorshed, Electronic Devices & Circuits, Prentice Hall of India,2003

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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. Charectereistics of active devices

   a) Forward & reverse charecterictics of a diode- measurement of forward resistance
   b) Common base characteristics of a transistor- measurement of current gain, input resistence and out put resistance, maximum ratings of the transistor
   c) CE characteristics of a transistor - measuremet of current gain, input and output resistance,relation between and study of the effect of ;leakage current, . maximum ratings of the transistor

   d) Comon sourse characteristics of a JFET –measurement of transconductance and drain to source resistance, use of FEt as VVR

4. Rectifying circuits
   a) HW rectifier b) FW rectifier c) FW Bridge rectifier d) 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 : a) Voltage biasing, current biasing and feedback biasing of BJT b) 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 & DC 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 characteristics of compound generator
4. Load characteristics 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 transformer
9. OC & SC test on single phase transformer - equivalent circuit
10. Load test 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.

SEMESTER IV

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

MODULE 1

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 fractlonal transfonnatlons, mapping by elementary functions like Z^2 , e , sin z, COS z, sin hz and COS hz, Z+ 1/Z

MODUL 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)=O, F(y,p,q)=O, F(z,p,q)=O, Fl(x,p) = F2 (Y,q), Lagrange's form Pp+Qq = R. Linear homogeneous partial differential equations with constant co-efficients.

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 Lap lace'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. 2nd ed

2 C.R. Wilie & L.C.Barrett: Advanced Engineering Mathematics, MGH Co, 6th ed :

REFERENCES:

Advanced Engineering Mathematics: Ervin Kreyszig, Wiley Eastern,9th ed

Complex Variables & Applications: Churchill R. V, Mgh Publishers,5th ed.

Advanced Engineering Mathematics, M.C.Potter, J.L.Goldberg Oxford University Press, 3rd ed

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 ofpins, Control signals, External Address / Data bus multiplexing, Demultip1exing, 1/ 0 mapped 1/ 0, and memory mapped 1/ 0 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), Programable display / Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251)-(their architecture, register 1 organization, initialization, hard ware and software interface to 8085.

TEXT BOOKS:

1 . Ghosh and Sridhar: 0000 to 8085 Microprocessors for Engineers and Scientists

2. Gaonkar: Microprocesors, Architecture, Programming and Applications.

REFERENCES :

1. A.Nagoor Kani, Microprocessors, Architecture & Programming, RBA Publications, 2004
2. Douglas V Hall, Microprocessors, Interfacing & Peripherals, Tata McGraw Hill 2nd ed
3. S.P.Chowdhuray, Sunetra Chowdhuray, Mcroprocessors & Peripherals, SCITECH, 2004

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 -BarkHausen criteria -RC oscillators -phase shift- Wienbridge -LC oscillators -Hartley , Colpitts -clapp oscillator, crystal oscillator .

Module II

Power amplifiers -classification -class A , class B; Class AB, Cla3s C and class D -Transformer coupled class AB Power amplifier -Transformer less 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 ed.

REFERENCE: -

1. Millrnan & Halkias , Electronic Devices & Circuits, Tata MeGraw Hill. 2004
2. Bapat K N , Electronic Devices & Circuits. Mc Graw Hill,1992
3. Millman & Taub, Pulse Digital and Switching WaveJorIm. Tata McGraw Hill. 2002
4. Millman & Halkias , Integrated Electronics, Tata McGraw Hill. 2003
5. Boylestead & Neshelsky .Electronic Devices & Circuit Pearson Education/ PHI Ltd,9th ed.
6. Schilling & Belove, Electronic Circuits ,Discrete & Integrated. Tata McGraw Hill, 3rd ed.
7. R.S. Moni. Amplifiers, Wiley Eastern
8. Ramakant A. Gaykwad. Op-amp. and Linear integrated Circuit., Pearson Education/ PHI Ltd.4th ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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, invariability. 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 Transfom1 -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 L TI 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 probability density function. Random processes, statistical averages. Stationary processes, Ergodic processes. Random processes and L TI 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, and limited and band pass processes.

MODULE IV

Noise: White noise, Narrow band noise, effective noise temperature and noise figure representation Sine wave ontAminated with narrow band noise. Effect of noise in SysteJns; eg: Linear and angle modulation systems, m-eshold effect and threshold extension, pre-emphasis and de-emphasis filtering. Introduction to Detection and stimation, Matched filters

TEXT BOOKS

I. Openheim & WilskY, Signa/s & systems, Prentice-HallIndia Ltd /Pearson Education, 2nd ed.

2. Simon Haykin, Communication .S:vstems, John Wiely, 4th ed.

3 Proakis & Salehi .Conlmunication Systems, Pearson Education/ Prentice-HallIndia Ltd, 2nd ed.

REFERENCES :

I. Steven W. SmIth, Digital Signal Processsing- A Practical Guide for Engineers and Scientists. Elsevier , India Pvt Ltd., 2006

2. Ambardar, Ana/og & Digita/ Signa/ Processing, Thomson Learning, 2nd Ed.

3. B P Lathi .Linear signal & ~vstems ,Oxford University Press,2nd ed.

4. C L Phillips, J M. Parr, EA Riskin, Signals,Systems. and Tralzsforms, Pearson Education 3rd ed.

5 RE Ziemer, W H Tranter,D. R Fannin, Signals and~vstems, Prentice-HallIndia Ltd.4th ed.
6. S S Soliman. M D Srinath, Continuoll.'i and discrete signa/s and systems, Prentice-HallIndia Ltd, 2nd ed. ..
7. Stark/Wood, Probability' and Random proces.with application to Signal Processing. Pearson Edu., 3rd ed.
8, Hwei-Hsu, analog & Digital Communication, Schaums series, McGrawHill, 2nd ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 405 PRINCIPLES OF MEASUREMENT AND INSTRUMENTATION .

MODULE I

Generalized Measurement system -Block diagram. Functional Description of Measuring System. Desired, Modifying, Interfering Inputs, Methods of eliminating Modifying and interfering Inputs. - Generalized performance characteristics -Static characteristics error and error analysis. Dynamic characteristics, ramp and impulse, step response of Zero order, 1 SI order, 2nd I order Measurement systems.

MODULE II

Variable Resistance Transducers -Types, Potentiometric Transducers -Loading Error, Sensitivity and Linearity.

Strain Gauges -types, Gauge Factor- Strain gauge bridge circuits, Tempcompensation. ISemi-conductor Strain gauge, Calibration of Strain gauge, Thermister, R. T .D.

Variable capacitance Transducers: Principles, types, Sensitivity and Linearity for variable air gap & Variable Permitivity Types. Capacitance Transducers bridge circuits.

Variable Inductive Transducers: Various types, L.V.D.T. -Principle and characteristics, Block diagram approach for a typical L. V .D. T .set up used for displacement Measurement.

Magneto striction -Materials -Magneto striction Transducers.

MODULE III

Piezo Electric Transducers: Piezo Electric, Element and their properties. Piezo Electric coefficients. Equivalent circuit and frequency response of P .E. Transducers.

Hall Effect transducers inductive transducers, digital transducers. Photo electric transducers, pyroelectric transducers and fibre optic sensors.

Elastic Transducers: Springs, Bellows, Diaphram, Bourdon Tubes -Their important features.

Ionization Transducers: Geiger Muller and Scintillation counters.

MODULE IV

TEMPERATURE: Temperature Scales, Mechanical temperature sensors, Resistance type temperature sensors, Platinum resistance thermometers, Thermisters, Thermocouples, Solid state sensors, Quartz thermometer, Radiation methods, Optical Pyrometer, Calibration of thermometers.

PRESSURE: Diaphragms, other elastic elements, Transduction methods, Force balance transducers, Solid state devices, Piezo-Electric transducers, Vibrating element pressure sensors, Pressure calibration using dead weight tester.

TEXT BOOKS :

Instrumentation transducers - Newbert
Measurement systems, application & design - Doeblin
Engineering measurements - Collet & Hope

REFERENCES:

lnstrumentation in scientific research Lion
Electrical and electronic measurements A K Sawlmey
Instrumentation for process measurement and control Norman & Anderson
Engg. Measurement & inst'n Adams. IF
Principles of industrial instrumentation D Patranabid
Industrial process measuring instruments G C Carrol

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 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 wave forms, with R. RL, RI- 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, wave forms. DC motor speed ~ control -various schemes -multi quadrant operation -simple circuits for speed control of series, PM and separately excited motors.

MODULE III.

Commutation schemes -(different classes) waveforms -single-phase invertors -series, parallel and bridge -PWM 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- 1 and 3 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. Mohammed H. Rashid, Power Electronics -Circuits. Devices and Applications, PHI Lid, 3rd ed.

REFERENCES:-

2. Power Electronics, IMPACT Learning Material Series, Indian Society for Technical Education.
3. J. Michael Jacob, Power Electronics: Principles & Applications, Thomson Learning, New Delhi, 2006

4. B. K. Bose, Modern Power Electronic." And AC Drives, Pearson Education/ Prentice-Hall India Ltd. 2003.
5. Biswanath Paul, Industrial Electronic.5 and Control. Prentice Hall of India. New Delhi. 2002 ,
6. D W Hart. Introduction to Power Electronic.'i. Pearson Education. 1997 ,
7. PC Sen, Power Electronics, Tata Mc Graw Hill. 2007
8. Singh & Khanchandani , Power Electronics, Tata Mc Graw Hill, 2nd ed.

9. Asgnar M syed , Power ElecJronics, Prentice Hall of India, 2003
10. Hays, The art of Electronic.5, Cambridge University Press. 1989 ,

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CS/EB/EC/EE/EI 407 DIGIT AL 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) l'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 rea1ization 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.

El 408 ELECTRONIC CIRCUITS LABORATORY

I Study of RC and RLC circuits - Frequency responses, pulse response, characteristics,
II Differentiating circuit and integrating circuit Biasing of Active devices
i) Voltage biasing, current biasing and Feedback biasing ofBJT
ii) Biasing of JFET
III Amplifying circuits
(i) Simple common emitter amplifier configuration -gain and bandwidth.
(ii) Common source amplifier

Functions of each component, gain measurement, frequency responses

IV Feedback amplifier circuits -Current series and voltage shunt- gain and bandwidth.. ,
V Oscillators -RC phase shift. Wein Bridge
VI Multivibrators -Astable ,Bistatle,monostable.
VII Sweep circuits -Simple transistor sweep,bootstrap sweep. vm 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.

SEMESTER V

CE/CS/EB/EC/EE/EI/IT/ME/SE/FT 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, nominal 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:

I. Irvrin Miller & Freind: Probability And Statistics For Engineers, Prentice Hall Of India

2. S.S.Sastry: Numerical Methods, PHI Publishers.

REFERENCES:

.I. P.Kandaswamy K. Thilagavathy, K.Gunavathy: Numerical Mehtods, S.Challd & Co.
2. A.Papoulis: Probabiljty,Random Variables And Stochastic Processes,MGH Publishers

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 502 INDUSTRIAL INSTRUMENTATION I

MODULE I

Measurement of Forcr, Torque, Velocity : Electric balance – different types of load cells – magnets – elastics load cell-strain gauge load cell-different methods of torque measurement, strain gauge, relative regular twist-speed measurement-revaluation counter- capacitive tacho-drag up type tacho D.C and A.C tacho generators – stroboscope.

MODULE II

Pressure Measurement :Units of pressure – manometers – different types – elastic type pressure gauges – Bourde type bellows – diaphragms – Electrical methods – elastic elements with LVDT and strain gauges – capacitive type pressure gauge – piezo resistive pressure sensor – resonator pressure sensor – measurement of vacuum – McLeod gauge – thermal conductivity gauges – Ionization gauge cold cathode and hot cathode types – testing and calibration of pressure gauges – dead weight tester.

MODULE III

Temperature Measurement : Definitions and standards – primary and secondary fixed points – calibration of thermometers different types of filled in system thermometer – sources of errors in filled in systems and their compensation – Bimetallic thermometers – Electrical methods of temperature measurement – signal conditioning of industrial RTDs and their characteristics –3 lead and 4 lead RTDs.

MODULE IV

Thermocouples and pyrometers : Thermocouples – law of thermocouple – fabrication of industrial thermocouples – signal conditioning of thermocouple output – thermal block references functions – commercial circuits for cold junction compensation – response of thermocouple – special techniques for measuring high temperature using thermocouples – Radiation methods of temperature measurement – radiation fundamentals – total radiation and selective radiation pyrometers – optical pyrometer – two colour radiation pyrometer.

TEXT BOOKS

1. Ernest O.Doebelin, Measurement systems Application and Design, .
International Student Edition, IV Edition, McGraw Hill Book Company, 1998

2. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.

REFERENCES

3. D.Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Ltd., New Delhi, 1999.
4. A.K.Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Raj and Sons, New Delhi, 1999.
5. P.Holman, Experimental Methods for Engineers International Student Edition, McGraw Hill Book Company, 1971.
6. B.C.Nakra and K.K.Chaudary, Instrumentation Measurement and Analysis, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1985.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 5O3 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, multiplexes. 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. Miios D Ercegovac, Tomas Lang, Digital systems and hardware I firmware algorithm, John Wiley, 1985

REFERENCES :

1. Charles H. Roth. Fundalnentals of Logic Design, Thomson Publishers, 5th ed.
2. J. M. Yarbrough, Digital Logic, Application, & Design, Thomson Publishers. 1997
3. Zvi Kohavi, Switching and Finite automata Theor, Tata McGraw Hill, 2nd ed.
4. Comer, Digital Logic State Machine Design, Oxford University Press, 3rd ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 504 ADVANCED MICROPROCESSORS

MODULE I

Architecture 16 bit microprocesors: Intel 8086 Architecture Memory address space and data organization Segment registers and memory segmentation l/O address space- Addressing modes comparison of 8086 and SO88. Basic 8086/8088 configurations, 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. Super scalar Architecture, Branch Prediction. Pentium II, Pentium Ill, Pentium lV 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 micro controllers

TEXTS:

I. Barry B. Brey, The INTEL Microprocessors -8086/8088.80186/80188. 80286.80386. 80486 Pentium and Pentium pro processor. Pentium 1/. Pentium III. Pentium 4 – Architecture. Programming and interfacing, Prentice Ha11 of India , 7th ed.

2. Kenneth Ayala, The 8051 Microcontroller , West Publishing Company.

3. Mazidi, The 8051 Microcontroller~. & Embedded Systems, Pearson Education' PHI Ltd 2nd ed.

REFERENCES:

I. K. Ray & K. M. Bhurchandi, Advanced Microprocessors and peripherals, Tata McGraw Hill, 2000.

2 YU-Cheng Liu & Glenn A Gibson, Microcomputer Systems. Architecture, Programming & Design. PHI Ltd, 2nd ed.

3. James L. Antonakos, The Intel Microprocessor Family Hardware and Software, Principles and Applications, Thomson Learning, 2007

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 (UI-YC -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 (.MRR. 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

Opamp 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- 1 order and II order filters. Quality factor -Design- Gyrator- Negative Impendence Converter-Filter using Simulated Inductance -Universal Active Filters -AIl Pass filters. Switched Capacitive Filters

MODULE III

Specialized IC's 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 range. 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 -perfomance 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:

I, R F Coughlin .Op (amps and linear Integrated circuit,Pearson Education! PHl Ltd, 6th ed.

2, Sargio Franko .Design with operational ,4mplifiers Analog ICs .McGraw Hill. 2nd Ed. 3. 3. Millman & Grabel Microelectrol1ics. Tata McGraw Hill, 2nd ed,

REFERENCES:

I. Gaykwad .Op-llmps and Linear integrated Circuits. Pearson Education/ Prentice-Hall India Ltd. 4th ed.

2. K R Botkar .Intf!,t':ra(ed circuits, K hanna Publishers, 9th ed.

3. Gray. Analog integrated circuis, John Wiley 2nd end

4. Horstian .Micro Electronics. Prentice-Hall India. 3r" ed.
5 Sedra & Smith. Microelectronic circuit, Oxtord University Press.3rd ed.
6, D A Bell. Microelectronic Circuit.", Prentic~-Hall India .2"d Ed.
7 David L.Terrell Op Amps-Design,Application and Troubleshooting.Elsevier India Pvt. L.td..2nd ed.
8. Joseph J. Carr.Linear Integrated Circuits elsevier 2006

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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.

Introduction to digital 1ilter design -specifications- FIR Digital Filters -Realizations -direct -cascade -lattice forms -hardware implementation -FIR filter design using Fourier series -window functions -frequency sampling technique- Finite word length effects in FIR filter design-Applications of FIR filters,

MODULE III.

IIR Digital Filters -Realizations -Direct -Cascade -Parallel forms -hardware implementation -Analog filter, approximations -Butterworth and chebychev approximations -Transformation techniques- The method of mapping of differentials -impulse invariant transformation -Bilinear transformation -Matched Z transform ; technique -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-ADSP2lXXX sharc processor .

REFERENCE :

1. John G Proakis & Dimitris G Manolakis, Digital Signal Processing, Pearson education/ PHI Ltd,3rd ed.
2. Oppenheim & Ronald W Schafer,Digital Signal Processing,Pearson education PHI Ltd, 2nd ed,
3. B, Venkataramani, M,Bhaskar, Digital Signal Processors: Architecture, Programming . and Applications, Tata McGraw- Hill, 2002
4. Ashok Ambardar, Digital Signal Processing, Thomson Learning, 2007 ,
5. Steven W, Smith, Digital Signal Processsing-A Practical Guidefor Engineer and Scientists, Elsevier India ,Pvt Ltd. 2006
6. Andrea; Antoniou , Digital Filters Analysis & Design, Pearson education ,2nd ed,
7. Avtar Singh & Srinivas, Digital Signal Processing, Thomson Learning, 2004
8. Sanjit K, Mithra .Digital Signal Procesing, Tata McGraw Hill, 3rd ed,
9. Emmanuel C, Ifeachor & Barni W. Jerris, Digital Signal Processing, A practical approach, Pearson education,2'1d ed
10. Charles S. Williams, Designing digital filters, Prentice-Hall India Ltd, 1986
11. JAE S. Lim, Alan V, Oppenheim, Advanced topics in signal procesing, Pearson education, 1988

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CS/EB/EC/EI 507 MICROPROCESSOR LABORATORY

PART 1- 3 Lab sessions

Pal1 I A (Compulsory)

I. Study of a t}'Pical microprocessor trainer kit and its operation
2. Interfacing and programming of 8255.(eg: trafic light control. burglar alarm. stop watch)
3. Interfacing and programming of 8253/ 8254.
4. Interfacing and programming of 8279.

Part I B*

I. 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 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 programs 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.

El 508 INSTRUMENTATION LABORATORY I

PART --A *
Measurement of Inductance by Maxwell's Bridge and Hay's Bridge
Measurement of Capacitance by Schering Bridge
Measurement of low resistance by Kelvin Double Bridge
Measurement of resistance by Wheat stone's Bridge
Study of Inductance Pick up Module
Study of Capacitance Pick up Module

* Atleast three topics from part A have to be covered.

PART -B *

1. Circuits using OP-AMPs
Instrumentation Amplifier.
Measurement of Off-set Voltage and its compensation.
Precision rectifiers
Second order active RC filters-Low pass, High pass, Band pass and Band elimination
Filters using simulation inductance
Universal active filter
Double integration Osci11ator

* Atleast four topics from part B have to be covered.

PART -C

II. Voltage regulator using 723 with short circuit protection
III. Voltage contro11ed osci11ator -Use as frequency modulator .

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.

SEMESTER VI

El 601 COMMUNICATION ENGINEERING

Module I

Introduction to various communication systems -Modulation -Different types of, modulation -AM- Expression -modulation index -bandwidth -AM Modulator (Block c level treatment)- Introduction to DSBSC, AM Balanced Modulator (Block level treatment) SSB, VSB -FM -Expression- Modulation Index -Bandwidth -Carson's rule -FM Modulator (Block Level treatment) -Phase Modulation -Comparison between FM iQ and PM -Annstrong Modulator (Block level treatment)

Transmitters (Block level treatment) AM Transmitter -Low level -High Level -FM Transmitter- FM Stereo Transmitter -Receivers -(Block level treatment only) -AM receivers -TRF- Super -Heterodyne receiver -Image frequency -Envelope detector -FM receiver- FM Stereo receiver -Pulse Modulation Systems -PAM -PWM -PPM.

Module II

Radiation and propagation of waves: (analysis not required) -Electro magnetic Radiation -Waves in free space -polarization -Reception -Effects of Environment -Propagation of waves: Ground waves -Sky -Way propagation -Space Waves -Antennas -Basic consideration -Wire radiator in space -Common terms and definitions -Effects of Ground on Antennas -Directional High frequency Antennas -UHF -Microwave antennas -Wide band and Special purpose antennas.

Module III

Micro wave techniques (analysis not required) -Microwaves in perspective Transmission lines -Wave guides -Cavity resonators -.Microwave semiconductors - Microwave tubes -Microwave antennas -Satellite Communications: Satellite orbits -~ Satellite communication Systems- -Satellite sub systems -Earth stations.

Module IV

Fiber optic communication Light -light wave communication systems -Fiber optic cable -Optical Transmitters and Receivers .
Modern communication Applications: Facsimile- Cellular Radio Systems -Radar - Television.

Text Books:

For Modules I, II .
Electronic Communications: Dennis Roddy and John Coolen, Prentice Hall ,India
For Modules III & IV
Communication Electronics: Frenzel , MGH.

References:

Electronic Communication Systems: Kennedy & Davis -Fourth Edition -Tata McGraw Hill Publishing Company Ltd.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 602 PROCESS CONTROL INSTRUMENTATION I

Module I

Level measurement -Simple methods. Visual indicators, float actuators, electrical resistance and static pressure type. Principle of operation. Level switches - Linearisation techlliques for level sensors. Ultrasonic and capacitor type level measurement. Measurement of level of solids - Paddle wheel type. Le\'el measurements using pressure sensors -diaphragm.

Measurement of humidity -Hygrometer various types -Dew cells -Measurement of moister - Conductance type -Capacitance type -Spectral type.

Module II

Viscometry -different types of viscosity meters -consistency measurement -Pneumatic and electrical signal conditioning control of viscosity and consistency. PH meters - hydrogen, Ion concentration -Definition of PH value -Acidity -Alkalinity -PH measurement -calomel electrodes -PH measurement and electronic PH meter -Digital PH meters

Module III

Analysers -Gas analyser -Biochemical abs chemical reactors -Heat of reactors by ma calorimetry -Infrared and Ultra violet me Instrumentation Symbols and diagrams.

Analytical Instruments- Radiant energy types -X-ray detecting method and proportional counters -Geiger Muller Counter -Scintillation counters -spectrometers. Industrial Weighing- Pneumatic and electrical weighing -on line weighing and control Automatic bagging and bottling

Module IV

Pumps -Different types other than vacuum pumps construction -Characteristics - Efficiency specifications and typical applications with calculation -Control of centrifugal, rotary, reciprocating pumps -Throttling and on-off control.

Effiuent and water treatment -Chemical methods -Oxidation, reduction and neutralization - Biological methods of control.

Control schemes for compressors with special reference to surge control

References:

I) Principles of Industrial Instrumentation -D PTRANABIS
2) Industrial Process measuring instruments -G.C. CARROL
3) Transducers and Display Systems -Dr. B S SONDE
4) Measurement Systems -D.O. DOEBELIN

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 603 VLSl 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 :

I. Douglas A. Pucknell. Kamran Eshraghian .Basic VLSI Design, Prentice Hall lndia. 2nd.ed

2. Jan M. Rabaey. A. Chandrakasan, B. Nikolic, Digital Integrated Circuit- A Design perspecive, Pearson education, Prentice-Hal1 India Ltd. rd ed

REFERENCES:

I. Thomas E. Dillinger .VLSI Engineering .Prentice Hall International edition.

2. S M Sze. VLSl Technology:. Mc Graw Hill, 2nd ed.

3. Weste and Eshraghian. Principle of CMOS VLSI Design: ,A system. Perspective, Pearson Education 2nd ed.

4. Mead & Conway. introduction to VLSI system Design. Addison-Wesley Publishing Co.. 1980

5. Fabricius. Introduction to VLSI Design. McGraw-Hil1, 1990

6. Charles II Roth Jr, fundamental. of Logic Design, 'Thomson Learning. 5th ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 604 INDUSTRIAL INSTRUMENTATION II

Module I

Measurement of Pressure:-Introduction-Units and definitions-Standards of pressure- pressure and vacuum. Pressure measuring elements-Bourden gauge-Mcleod gauge-Float type pressure gauges-Knuden gauge-Momentum transfer gauges-.thermal conductivity gauge-pirani gauge. Dynamic effect of volumes and connecting tubing -dynamic testing of pressure measuring systems. Pressure measuring strain gauges. Differential pressure ;- elements-U tube manometer -Inclined manometer -Ring balance type manometer- Bellows-principle of operation, theory and construction-Pressure transducers-diferential pressure transducers-pneumatlc and electncal pressure transmitter-Pressure swltches-very high pressure measurement (70 kPa) transducer-Pressure regulation and control-Pressure signal multiplexing.

Module II

Differential pressure meters:-Orifice plates flow-turbulent flow-pitot tube-installation p registering instruments-wet and dry type. square root compensation-pressure trans measuring units-selecting position and inst meters for liquids and gases-principle of ope theory-principles of operation and construction

Module III

Density measurement, different methods of applications-continuous weight measurement in conveyor belts-strain gauge load cell melthod Pneumatic, Hydraulic, load cells Different methods of weight measurement-float principles -Air pressure balance method , -Gamma rays method -Future trends. measurement ofturbidity-Principles, different methods, and applications.

Module IV

Power plant instrurnentation:-Scheme of a typical power plant. Pressure, temperature flow and level. Vibration and expansion. Analyzers-flue gas analysis. Nuclear power plant instrumentation-safety measures pneumatic instrumentation. Thermal power plant instrumentation.

Control valves: final control operation-electrical and pneumatic Signal conversion- actuators-different types of automatic control valves. Butterfly valves-ball valves-v ball valves, glob valves-plug valves, gate valves (brief study)

Positioner and advantages of using positioner. Solenoid valves.

References:

I) MeasurementSystem application & design Earnest O-Deobelin-Mc Graw Hill -

2) Industrial Instrumentation-Donald P.Eckman-Vilky Eastern Ltd

3) Mechanical & Industrial measurements-R K Kain-Khanna Publishers

4. Prillciples ol.lndustrial Instrumentation-D.Palranabis- Tala Mc Graw Hill

5) Measurement and control of temperature in industry- Yoyd R Constable

6) Pyrom~lry-Wood J P and Cooler. J M Tata Mc Graw Hill

7) Measurement System application and design-Eamest.O.Doeblin Tata Mc. Graw Hill

8) Process control instrumentation technology-Austin D Johnson-John Wiley & Sons

9) Instrument engineers handbook-third edilion-Process control-Bela-G.Lpitak-Butterworth Heinemann-Distribution Asian books New Delhi

10) Process control-Donald P Eckman
11) Instrument engineers handbook-third edition-Process measurement and analysis-
. Bela- G.Liptak-Butterworth Heinemann-Distribution Asian books New Delhi

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

CS/EB/EC/EI 605 CONTROL SYSTEMS ENGINEERING

MODULE I.
Basic idea of control systems and their classification -differential equations of systems -linear approximation .Laplace: transform and transfer function of linear 3ystem -Model of physical system (Electrical, mechanical and electromechanical) block diagram -signal flow graph -Mason's gain formula.

MODULE II.
Time domain analysis -Representation of detenninistic signals -First order system response -S-plane root location and transient response -impulse and step response of second order systems -perfonnance - charactcristic~ in the time domain -effects of derivative and integral control -steady state response -error constant -I!cneralised 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'S response and frequcncy domain perfonnance 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 Icompensation -cascadc compensation networks and their design in the frequency domain -simple design in S-plane

TEXT BOOK:

I. Ogata K. Modern Control Engineering, Prentice-HallIndia Ltd /Pearson Education, 4th ed

REFERENCES:
1. Dorf. Modern Control system. Pearson Education, 8th ed.
2. Franklin. Feed back Control.S:vstem.\,. Pearson Education
3. Kuo B. C, Automatic COIltrol System. Prentice-Hall India Ltd, 8th ed.
4. Nagoor Kani. Control S.vstems, RB Publishers. 1998
5. Ogata. Di.\.crefl' Ti,ne Col/trul Systems. 2nd edn., Pearson EducationJ Prentice- 6. Nagarath & Gopa!, Colltrol System Engineering. Wiley Eastern, 2nd ed.
7. Ramkayan. Control Engineering, Vikas Publications, 2007
8. M N Banrlyopadhyaya. Control Engineering- Theory & Practice, Prentice-Hall
9. Glad. Control Theory Thomson Learning. 2000

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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, Micro controller : 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 PICl6 family, PIC16F873 processor architecture- features, memory organization, on chip peripherals, Watchdog timer, ADC, Data EEPROM, Asynchronous serial port, SPI mode, 12C mode.

Development systems and compilers for PIC micro controllers. Interfacing with LCD, ADC, sensors, stepper Rotor. key board, DAr:. 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.

TEXT BOOKS :

L. Programming for Embedded systems- Dream tech Software Team, Wiley Dream tech, 2002
2, Rajkarnal, Microcontro//ers -Architecture. programming. Interfacing and system Design, Pearson Education, 2005 -
3, Nebojsamatic, 77Ie PIC MicroconJrol/er. Mikro Elekronica.

REFERENCES:

I. Daniel w. Lewis. Fundamentals of Embedded Software where C and Assembly Meet, PHI Ltd. 2003
2. DSIOI374: National Semiconductor reference manual.
3. Embedded I RealTime systems: Concepts. Design and programming, Dream tech Software Team, Wiley Dream tech. 1993
4. Bamett Cox & O'Cull, Embedded C Programming and the Microchip PIC, Thomson Learning, 2004

5. 1 187D: Atmel semiconductor reference manual.
6. www.atmel.com
7. DS30292B: .Microchip reference manual.www.microchip.com
8, Rajkamal, tinbedded .S:v.\lems -Architecture, Programming and Design , Tata McGraw Hill, 2005
9, Steve Heath, Embedded .Systems Design, Elsevier India Pvt. Ltd., 2ed ed.
10. Jack R, Smith, Programming the PIC Microcontroller with M Basic, Elsevier, 2007

II. Wayne Wolf. Computer,as Components: Principle. of Embedded computer system Design, Elsevier, 2005

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 607 INSTRUMENTATION LABORATORY II

PART -A (BOTH I& 2)

.1. PLL Measurement of Capture range, Lock range, Use as FM discriminator
and frequency synthesizer
2. Familiarisation with Analog multiplier IC, use as AM modulator and frequency doubler.

PART -B.
Measurement of viscosity
Measurement of temperature
Measurement ofpH.
Measurement of pressure
Dynamic response of first order system
Dynamic response of second order system
Pressure to current & Current to pressure converter
Use of L.D.R. for measurement of physical variation
Measurement of strain /force
Measurement of speed
Atleast five topics from part B has to be covered.

PART -C*
SCR characteristics
SCR triggering circuits
Phase controlled rectifiers
Dc motor speed control
Chopper circuits
Power transistor characteristics
Power MOSFET characteristics
Simple inverter circuits
Microprocessor based motor control
* Atleast five topics from part C 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.

El 608 MINI PROJECT

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

Guidelines for Evaluation

a) Attendance & regularity	10
b) Work knowledge & involvement	30
c) End semester presentation & Oral examination	20
d) Level of completion & demonstration of functionality	25
e) Project Report	15
Total	100

Note : External projects & R&D projects need not be encouraged at this level. Points (a) & (b) 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.

SEMESTER VII

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

MODULE I

Organization, Introduction, definition of organization, system approach applied to organization, necessasity 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 II

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-ordinating, communicating, decision making

MODULE III

Personal management, Introduction, definition, objectives, characteristics, functions, principles of organization of personal management,

Markets and marketing : Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behavior 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 IV

Productivity and production, measurement of productivity, productivity index, productivity improvement procedure

Materials management and purchasing : objectives, functions, importance of materials management, stores and store keeping

Inventory control : classification, functions, inventory models, inventory costa, 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. Prasanna Chandra , Finance Management,TMH.5th ed.,
5. Monks J.G Operations Management ,MGH

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 702 PROCESS CONTROL INSTRUMENTATION II

MODULE I

Need for process control – mathematical model of first – order level, pressure and thermal processes – higher order process – interacting and non-interacting systems – continuous and batch process – self-regulation – servo and regulator operation.
Basic control actions – characteristics of on-off, proportional, single-speed floating, integral and derivative control modes – P+I, P+D and P+I+D control modes – pneumatic and electronic controllers to realize various control actions.

MODULE II

Optimum controller settings : Evaluation criteria – IAE, ISE, ITAE and ¼ decay ratio – determination of optimum settings for mathematically described processes using time response and frequency response – tuning – process reaction curve method – Ziegler Nichols method – damped oscillation method.

MODULE III

Multi loop Control : Feed forward control – ratio control- cascade control – inferential control – split range control – introduction to multivariable control – examples from distillation column and boiler systems.

MODULE IV

Final control element : I/P converter – pneumatic and electric actuators – valve positioner – control values – characteristics of control valves – inherent and installed characteristics – valve body – commercial valve bodies – control valve sizing – cavitation and flashing – selection criteria.

TEXT BOOKS

1. Stephanopoulis, G, Chemical Process Control, Prentice Hall of India, New Delhi, 1990.
2. Eckman. D.P., Automatic Process Control, Wiley Eastern Ltd., New Delhi, 1993.

REFERENCES

1. Pollard A.Process Control, Heinemann educational books, London, 1971.
2. Harriott. P., Process Control, Tata McGraw-Hill Publishing Co., New Delhi, 1991.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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 virtual circuit service, routing principles, link state routing – distant vector routing hierarchical routing, multicast routing, IGMP internet protocol, IPv4 addressing, routing and forwarding datagram, - datagram format, datagram fragmentation – ICMP – DHCP – network address translators, 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 Timeout – 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: Serivce provided by data link layer – Erro detection and correction Techniques – Elementary data link layer protocols – Sliding window protocols – Data link layerin HDLC, Internet. Multiple Access protocols: Channel partitioning protocols: TDM-FDM-Code Division Multiple Access(CDMA). Randpm Access Protocols : ALOHA, CSMA and CSMA/CD. Local Area Networks: 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 Approache Featuring the Internet, Pearson Education, 2nd Ed.
2. F. Halsall, Data Communication, Computer Networks and Open Systems, 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 Networking, Pearson Education, 2002
3. Uyless Black, Computer Networks – Protocols, Standards and Interfaces, PHI Ltd, 1994
4. Andrew S. Tanenbaum, Computer Networks, Pearson Education/PHI Ltd. 4th ed.

5. Behrouz A. Fouruzan, Data Communications and Networking, Tata McGraw Hill, 2nd ed.
6. Leon-Garcia and I.Widjaja, Communication Networks, Tata McGRawHill, 2000
7. Bertsekas and Gallagar, Data Networks, Prentice Hall India, 2nd ed.
8. Douglas Comer and David L.Stevens, Internetworking with TCP/IP Vol.I(5th edn).II(3rd edn), and III(2nd edn),Prentice Hall India Ltd.
9. Richard Stevens. W, TCP/IP Utilities – Vol.I, The Protocols, Addison Wesley, 1994
10. Sidnie Feit, TCP/IP Architecture, Protocols and implementation, McGraw Hill, Newyork, 1993

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 704 ANALYTICAL INSTRUMENTATION

MODULE I

pH CODUCTIVITY & DISSOLVED SYSTEMS ANALYSER
Sampling systems – ion selective electrodes – conductivity meters – pH meters – dissolved oxygen analyser – sodium analyser – silica analyser – moisture measurement.

MODULE II

Gas Analyser **:** Oxygen analyser – CO monitor – NO_2 analyser –H_2S analyser – dust and smoke measurement – thermal conductivity type – thermal analyser – industrial analysers.
Chromatography Gas chromatography – Liquid chromatography – Principles, types and applications – high pressure liquid chromatography – detectors

MODULE III

Spectro photometers : Spectral methods of analysis – Beer's Law û UV – Visible spectrophotometers – single beam and double beam instruments – sources and detectors – IR spectrophotometers – sources and detectors – FTIR spectrometers – atomic absorption spectrophotometers – flame emission spectrophotometers – sources of flame photometry – applications.

MODULE IV

Nuclear magnetic resonance and radiation techniques
NMR – basic principle – NMR spectrometers – applications – introduction to mass spectrophotometers – nuclear radiation detectors – GM counter – proportional counter – solid state detectors – introduction to x- ray spectroscopy

TEXT BOOKS

1. Willard, H.H., Merrit L.L., Dean J.A Seattle F.L., 'Instrumental Methods of Analysis', CBS Publishing and Distribution, 1995
2. Robert D.Braun, Introduction to Instrumental Analysis, McGraw–Hill, Singapore, 1987.

REFERENCES

1. Skoog, D.A. and West D.M., Principles of Instrumental Analysis, Holt Sounder Publication, Philadelphia, 1985
2. Ewing G.W., Instrumental Methods of Analysis', McGraw-Hill, 1992
3. Mann C.K. Vickers, T.J. and Guillick W.H Instrumental Analysis, Harper and Row Publishers, New York, 1974.
4. Liptak, B.G, Process Measurement and Analysis, Chilton Book Company, 1995
5. Frank A.Settle, Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall, New Jersey, 1997

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 705A INTELLIGENT SYSTEMS

MODULE I

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

MODULE II

Artificial Neural Networks: Biological aspects, Pitts Neuron Model, Perception model, Learning algorithm – supervised & unsupervised multilayer perception, Back propogation algorithm, Associative memory, Feedback networks, Applications of Neural networks.

Module III

Fuzzy systems : Fuzzy sets, Measures of fuzziness, Fuzzification, Fuzzy relations, Linguistic descriptions and their analystical forms, Defuzzufucation methods, Application of fuzzy logic, Fuzzy Neural Networks

MODULE IV

Genetic algorithms and Evolutionary Programming: Genetic algorithms – operatos, 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 BOOKS:

1. 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 Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 705 B. TELEMETRY AND REMOTE CONTROL

MODULE I

Fundamental concepts: Functional blocks of telemetry and tele control systems, Methods of telemetry -Electrical, pneumatic and optical telemetry, telemetry standards.

Landline telemetry: Electrical telemetry -Current, Voltage, synchro and position

MODULE II

Radio telemetry : Transmission and receiving techniques, RF modulation demodulation -AM, FM, PM, PCM, FSK, Delta and adaptive modulation multiplexing and demultiplexing -Digital coding.

MODULE III

Optical telemetry: Optical fibres for signal transmission -source for fibre transmission -Optical detectors. Trends in fibre optic device develop Examples of optical telemetry system.

MODULE IV

Analog and digital techniques in telectrol, Remote transmission, signalling adjustment, guidance and regulation reliability of telectrol installations. Design of telectrol installations. .

Satellite telemetry and telecontrol system.

REFERENCES:

I. E.L. Gruenberg- Handbook of telemetry and remote control- McGraw Hill.
2. R.E. Young- Telemetry Engineering- Little Book Ltd., J.K.
3. G. Swoboda -Telecontrol methods and applications of telemetry and re control- Reinhold Publishing Company, U.K.
3. R.k Rajangam - Industrial telemetry-Lecture notes, IISc., Bangalore.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 705 C. POWR PLANT INSTRUMENTATION

Module I

An overview: Brief survey of methods of power generation – Hydro, thermal, nuclear, solar, wind etc. dependence of instrumentation on the method of power generation, power plant general structure. Pulverizes and burners, fans, dampers and actuators, Super heaters, steam traps, economizers, recuperates and regenerators, cooling towers, feed water, generator turbine cooling systems. Importance of instrumentation and control.

Reading and drawing of Instrumentation diagrams : Flow sheet symbols – ANSI symbols for lines, valves, heat transfer, dryer, material handling equipment, storage handling equipment, storage vessels, flow sheet codes and lines. Graphical symbol for pipe fitting, valves and piping, instrumentation symbols, standards specifications – One line diagram for typical measurement and control schemes for flow, temperature. One line diagram of typical pneumatic, hydraulic and electrical instrumentation system.

Module II

Parameters and measurements : Electrical measurements – Current, Voltage, Power, frequency – no electrical parameters, flow of feed water, fuel, air and steam with correction factors for temperature – pressure level. Radiation detectors – Smoke density measurement.

Module III

Control loops and interlocks: Combustion control – Control of pressure, air/fuel ration, furnace draught and excess air control, drum level (three element) control. Main and reheat steam temperature control. Burner tilting up, by pass damper - Super heater spray and gas recirculation control – BFP recirculation control – hot well and aerator level control – interlock MFT turbine trip conditions – Pulverizer control.

Module IV

Turbine Monitoring and Control: Consenser vacuum control – Gland steam exhaust pressure control – speed, vibration, shell temperature monitoring – Lubricating oil temperature control. H_2 generator cooling system. Nuclear reactor control loops – Description – Function – Safety measures in nuclear reactor control.

Computer in power plant : Load dispatching coputer, generation station computer, supervisory, DDC, DAS, DCC.

References:

1. Modern power station practice, Volume 6, instrumentation, Control and Testing – Pergamon Press, Oxford.
2. E.L Wakil MM – Power Plant Technology – McGraw Hill
3. Richard Dolezal and Ludrik Varcop – Process dynamics(Automatic control of steam generation plant), - Elsevier Publishing Company Ltd.
4. J. Balasubramanian and R. K Jain - Modern power plant engineering – Khanna Publishers
5. Stephen Michoel and Anthony Lawrence Kohal – Standard Boiler Operations Questions and Answers – Tata McGrawHill
6. B.G Liptak – Instrumentation in Processing industries – Chilton Book Co.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EB/EC/EI 705 D 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 presenatiton in mechatronic systems – signal measurement and calibration – Design Considerations

MODULE II

Actuation System : Pneumatic & Hydraulic Systems: Hydraulic Pumps, Process Control Valves, Directional and Pressure Control Valves, Linear and Rotatory 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 Systms : 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 requires).

MEMS : Internal structure, advantages, manufacturing, applications, Fiber Optic Devices n Mechatronics(For this module assignments on Simulation studies using computer software such as MATLAB with SIMULINK is recommended)

MODULE IV

Mechatronic System Controllers : Structure, I/O processing, Programming, applications – Selection criteria. Typical Mechatronic Systems: Robotoc 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 McGraw Hill, New Delhi, 2004

REFERENCES:

1. Godfrey C. Onwubolu, Mechatronics Principles and Applications, Elsevier India Pvt. Ltd., Delhi, 2006
2. M.D Singh, J.G Joshi, Mechatronics Principles and Applications, Elsevier India Pvt. Ltd, Delhi 20006
3. Dradly. D. A, Dawson. D, Burd N.C and Loader A.J, Mechatronics – Electronics in Products & Processes, Chapmen & Hailm 993

4. Mechatronics , HMT Limited, Tata McGraw Hill, 1998
5. James Harter, Electromechanics – Principles concept and Devixes – Prentice Hall India Ltd, 2nd ed.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 705 E. ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Module I

AI and Expert System – Introduction, components of Expert system – Construction Methodology and Tools for Building – Expert Systems, Characteristics of E.S. Hill climbing Techniques, knowledge representation, Predicate calculus, Resolution, Robot Programming Languages

Module II

Robotics Basic concepts, power sources and sensors – Definition and origin of botics, Different types of robots, Degree of freedom. Asimov's laws of robotics, dynamic stabilization of robots, Determination of H.P of motor and gearing ration, variable speed arrangement, Lead acid and nickel cadmium batteries, path determination, vision, ranging, laser, acoustics and tactile sensors

Module III

Manipulators, actuators and grippers – Constructin of manipulators, Manipulator dynamics and force control, Electronics and pneumatic manipulator, control circuits, pneumatic hydraulic and electric actuators, and effectors, various type osf grippers, design considerations.

Module IV

Kinematics – Homogeneous co-ordinates, solution of inverse. Kinematic problem, multiple solutions Jacobians, Work envelope.

References:

1. Mikell P. Groover, Michell Weisss, Roger N. Nagel and Bnicholas G. Odery – Industrial Robotics Technology Programming and Applications – McGraw Hill.
2. E.L Stafford – Complete Handbook of Robotics – Tab Books
3. K. Shimon – Handbook of Industrial Robots – John Wiley
4. John J. Grey – Introction to Robotics, Mechanics and Control – Addison Wesley. Ro

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 706 SIGNAL PROCESSING LABORATORY

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

Experiments

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

The above experiments should be done using MATLAB and DSP Trainer Kit. The student should be able to apply the above tools in a small application.

EI 707 PROCESS CONTROL LABORATORY

1. Study of different types of Process stations
    a) Temperature Process Control trainer
    b) Level process control Trainer
    c) Pressure process control trainer
    d) Flow process control trainer

2. Study of various types of linear controllers
    a) Characteristics of ON – OFF control
    b) Characteristics of P control
    c) Characteristics of I control
    d) Characteristics of D control
    e) Characteristics of P+I control
    f) Characteristics of P+D control
    g) Characteristics of P+I+D control

3. Studies of cascade control
4. Studies of feed forward control
5. Characteristics of control valve
6. Use of programmable logic controller and DCS
7. Characteristics of devices connected with process control systems
    a) Characteristics of thermocouple
    b) Characteristics of signal conditioner
    c) Characteristics of RF capacitance type level sensor
    d) Characteristics of I/P and P/I converters
    e) Characteristics of IR type flow sensor
8. Studies of ratio control
9. Supervisory control – SCADA package
10. Non linear plant control – pH conductivity

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.

EI 708 SEMINAR

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

EI 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 evaluation team comprising of 3 internal examiners including the project guide.

SEMESTER VIII

EI 801 INSTRUMENTATION SYSTEM DESIGN

MODULE I

Microcontrollers :Types and selection – Application example.
Microcontroller sources Family members, bus width program and data memory parallel ports, D/A and A/D converters, reset circuitry, watchdog timers, power – down considerations

MODULE II

Real – time control : Interrupt Structures programmable timers, real-time clock, latency, interrupt, density and interval constraints.

MODULE III

Programming Framework :CPU register, Structure, addressing modes, instruction sets, assembly languages, assemblers.

MODULE IV

Software building blocks : Queues, tables and strings, program organization, micro controller expansion methods, I/O hardware alternatives, development tools, and Motorola and Intel micro controller details

TEXT BOOKS

1. John, B.Peatman, 'Design with Micro-controllers', McGraw Hill International Ltd., 1989.
2. Michael Slater, 'Microprocessor – based design: A Comprehensive Guide to Effective Hardware Design', Prentice Hall, 1989.

REFERENCES

1. S.Yeralan and A.Ahluwalia, 'Programming and Interfacing the 8051 Micro controller', Addison Wesley, 1995.
2. Intel Manual on 16 bit – embedded controllers, 1991.
3. Motorola manual on 8 and 16 bit micro controllers.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 802 BIOMEDICAL INSTRUMENTATION

MODULE I

Source of bio electric potential -resting and action potential -propagation of action potential- The bio electric potential- Electrodes for ECG , EEG and EMG- Micro electrodes

Bio medical recorders- electro cardio gram -lead systems -block diagram of ECG - EEG -EMG (Block diagram level treatment only)- Ink jet recorders- UV recorders

MODULE II

Therapeutic equipments – cardiac pacemaker – External and implant able pacemakers – power sources for implant able pacemakers leads and electrodes – cardiac defibrillators – implant able defibrillators – electro surgical machines

MODULE III

Imaging Systems -Basics of X-ray machines -Computed Tomography- MRI Systems -basic NMR components -Thermo graphic Equipment -Real time ultra sonic Imaging systems.

MODULE IV

Bio telemetry -Introduction -components -implant able units -single channel telemetry systems -multichannel wireless telemetry systems -transmission of analog physiological Signals over telephone

TEXT BOOKS

1. Bio medical Instrumentation and Measurements, Leslie Cromwell
2. Hand book of Bio medical instrumentation R.S. Khandpur
3. Principles of Bio medical Instrumentation, Richard Aston .

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

El 803 OPTOELECTRONIC INSTRUMENTATION

MODULE I

Interferometers -Fabry-Perot and Michelson interferometers -Mach-Zehnder interferometer - interference filters -interferometer methods in metrology and testing of optical components - optical spectrum analyzer -modulation of light -electro-optic effect -Kerr modulators -magneto-optic devices -acoustic optic modulators -display devices - light emitting diode -plasma displays -liquid crystal displays -pin diodes -photo detectors -thermal detectors -photon devices-optocouplers.

MODULE II

Optical materials and coating -moire fringes -photo elasticity -lasers -principles of operation - Einstein relations -population inversion -optical feed back -laser modes - classes. of lasers -solid state, gas and liquid dye lasers -semiconductors lasers - properties of laser light.

MODULE III

Optical resonators -Rectangular cavity -Open planer resonator -Quality factor Ultimate line width -Mode selection -Transverse & longitudinal -Q Switching -Mode Locking -Confoca1 resonator, Planar resonator -Spherical resonator

Optical Modulators: Electrooptic, Accousto optic, and Mechanooptic modulators - Theory, Principle of Operation, Construction and applications

MODULE IV

Applications of 1asers -laser gyro -Laser Doppler Anemometry (LDA) -holographic interferometry -distance measurement -holography -principles and applications - optical fibres - light guidance through fibres -step index and graded index fibres - multimode and single mode fibres -fibre fabrication

Measurement of fiber characteristics -attenuation, dispersion and refractive index profile measurement -OTDR -fiber optic components, Fibre losses, Fibre materials, Integrated Optics, couplers, splicers and connectors -applications of optical fibers - optical fiber communication - fiber optic sensors -recent trends

REFERENCE :

1. Meyer-ArelIrlt J.R.. "Introduction to Classical and Modern Optics", PHI
2. Wilson l. &:Hawkes l.F.B, "Optoelectronics: An Introduction", Prentice Hall of India
3 Thygarajan K. & Ghatak A. K., "Lasers -Theory and Applications" Plenum Press
4 Guimaraes ~.O.N. & Mooradian A., "Lasers and Applications", Springer Verlag.
5 Cock W .E. ,."Engg Applications of Lasers and Holography", Plenum Press.
6. Cheo P .K., .."Fibre Optics-Devices and Laser Systems", PHI.
7. Jain R.K., "Egineering Metrology", Khanna Publishers

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

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

Module I

Digital Image Fundamentals : representation – elements of visual perception – simple image formation model – Image Sampling and quantization – basic relationships netween 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 III

Image Enhancement : Spatial domain methods: Point processing – intensity transformations, histogram processing, image subtraction, inage averaging; Spatial filtering – smoothing filters, sharpening filters,. Freauency 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 – Geometric transformations

Fundamentals of Colour image processing: Colour models – RGB, CMY, UIQ, 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 & Fractal image compression techniques.

TEXT BOOK:

1. Gonzalez and Woods, Digital Image Processing, Pearson Education/Prentice Hall India Ltd., 2nd ed.

REFERENCES:

1. Anil K. Jian, Fundamentals of Digital Image Processing, Pearson Education/PHI Ltd, 2003
2. Mark Nelson, Jean-Loup Gailly, The Data Compression Book, BPB Publications, 2nd ed.
3. Pratt William K., Digital Image Processsing, John Wiley & Sons, 2nd ed.
4. Chands & Majumdar, Digital Image Processing and Analysis, PHI Ltd, 2003
5. M. Sonka, V. Hlavac, R. Boyle, Image Processing, Analysis and Machine vision, Thomson Learning, 2006

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 804 B. ADVANCED ANALYTICAL TECHNIQUES

MODULE I

X-ray methods of analysis -Basic principles -Sources -Detectors X-ray absorption methods -X-ray fluorescence technique -X-ray diffraction methods -Electron probe microanalysis.

MODULE II

Electron and ion Spectroscopy -X-ray and UV photoelectron spectroscopy -ESCA - Electron impact spectroscopy -Auger electron spectroscopy -Ion scattering spectroscopy -Ion scattering spectroscopy -Rutherford back scattering -0 Principles - Instrumentation and analysis.

MODULE 111

Advanced topics in magnetic resonance spectrometry -Fourier transform techniques -: Nuclear quadruple resonance spectroscopy -Cl3 NMR- 2nd NMR -Advanced topics in ! mass spectrometry -Quadruple mass analyser.

MODULE IV

Electron microscopy- TEM = SEM -Principles, instrumentation and analysis, Scanning tunneling microscopy, Atomic force microscopy -Principles, instrumentation and analysis -Applications. Photoacoustic and photothermal spectrometers -Principles and instrumentation spectroflourimeters and phosphorimeters -Electrochemical instruments -Conductivity, meters -Coulometers -Amperometers -Radioochemical instruments.

REFERENCES:

1. Willard, Merrit, Dean and Settle -Instrumental Methods of Analysis -CBS. ;1
2. G. W. Ewing- Instrumental methods of chemical analysis -McGraw Hill.
3. A. Skoog and M. West -Principles of Instrumental analysis -Hall Sanders International
4. 4. R.S. Khandpur -Handbook of Analytical instruments - Tata McGraw Hill.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EC/EI 804 C ASIC DESIGN.

MODULE I

Introduction to ASICs: -Types of ASICs -Design flow -Combinational Logic Cell -Sequential logic cell- Data path logic cell -VO 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 UO 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, A TPG-D-Calculus, Basic A TPG 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 BOOKS ::

1. M.J.S .Smith, Application Specific Integrated Ci~cuits, 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 lnc., 1985

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EL 804 D. AUDIO AND VIDEO SYSTEMS

MODULE I

Audio Engineering: Audio frequency range -loudness -pitch -decibel -sound pick up devices microphones -types condenser -carbon -piezo electric -direction pattern - parameters of microphone: -frequency range- sensitivity -impedance-noise. Sound reproduction devices: loud speaker- typical specifications Production of speech signal: - Simple view of speech production - spectrogram Acoustics of speech production. Uniform tube model- discrete time model -vocal fold *I* Vocal tract interaction Characteristics of hearing -acuity threshold and masking of detection "

MODULE II

Speech coding and Compression:- companding- adaptive quantization -diferential and residual quantization -Vector quantization. Frequecy domain coding: Subband coding . Model based coding: linear predictive coding -VQ LPC coder. MPEG : Block diagram of audio encoder decoder. Recording of sound: recording media- magnetic -optical storage systems Coding and decoding applied to CD

MODULE III

Video Engineering: Elements of Television system:- Basic block schematic of television transmitter and receiver, camera , picture tube, Scanning, human factor consideration, flicker, interlaced scanning, number of scanning lines, Horizontal and vertical resolution, maximum video frequency. resolution and bandwidth, Composite video signal -vertical and horizontal synchronization Television camera: -Working principle of CCD- its working -Color television camera: block schematic explanation Modulation -Positive and negative modulation and its comparison, high leve1 and low level modulation and its
comparison. vestigial side: band transmission. transmission of sound signal.

MODULE IV

Colour Television: Compatibility consideration, Color response of human eye, Three color theory, additive mixing of colors, chromaticity diagram, Luminance and chrominance, color difference signal and its generation, Frequency interleaving and Colour burst signal Colour TV picture tubes: CRT, LCD and plasma displays. Monochrome and colour reception: Detailed block schematic -Block schematic explanation Basic colour television systems: PAL and NTSC - Block schematic explanation

REFERENCES

1. Multi Media Communication Fred Halsal Pearson Education
2. Basic Television Engineering: Bernad Grob, Mc Graw Hill.
3. Monochrome and colour television: R R Gulati, Wiley Eastern
4 Discrete time Speech Signal Processing :Thomas Quatieri, Pearson Education
5. Digital Communication, B salkar :Pearson Education
6. The Electronics Hand Book :J C Whitaker IEEE press

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.
Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 804 E. ADVANCED BIOMEDICAL INSTRUMENTS

MODULE I

Heart-Iung machine -Artificial heart valves -Pacemakers and Defibrillators - Anaesthesia machine -0 .Blood cell counter -digital thermometer -Audiometer - Electron Microscope -up based ventilator biomaterials.

X-ra machine -:- Radiography, fluoroscopy -image intensifiers -Conventional X-ray Imaging - Angiography -Computed tomography -linear tomography -tomography scanner- applications.

Magnetic Resonance Imaging systems -Basic NMR components.

MODULE II

Ultrasonic imaging systems -Physics of ultrasonic waves, medical ultrasound. construction of an ultrasonic transducer. different modes of operations of ultrasound -A scan, B scan - Echocardiograph (M mode), Real time ultrasonic imaging system, Computer controlled ultrasonic imaging -Applications.

MODULE III

Laser application in machine -Laser- Pulsed Ruby Laser, Nd- AG laser, Argon Laser, CO2 laser, Helium-neon laser -applications -Advantages of laser surgery -Laser based Doppler blood flow meter- Endoscope -Cardio scope -Laproscope -Endoscopic laser coagulator cryogenic surgery.

Medical thermography- Physics of themography.

MODULE IV

Medical thermography -Physics of theromography -Them1ographic equipment Quantitative medical thermography -Infrared, Liquid crystal and Microwave

Thermography- Medical applications of thermography.

Computer applications in Medicine -Computer aided ECG analysis -Computerized Catheterisation Laboratory -Computerised Patient monitoring system..

REFERENCE:

I. Leslie Cromwel] -Biomedical instrumentation and measurements -Prentice Hall.

2. L.A. Geddes and L.E. Baker -Principles of Applied biomedical instrumentation -John Wiley and sons.

3. B. Jacobson and J.G. Webster -Medicine and Clinical Engineering -Prentice Hall of. India

4. Macka SturatBiomedical telemetering- John Wiley.

5. R.S. Khandpur -Handbook of biomedical engineering -Tata McGraw Hill.

Type of Questions for University Exam.

Q.1. Eight short answer questions of 5 marks with two questions from each of the four modules.

Q.2 to Q.5: Two questions A & B of 15 marks from each module with option.

EI 805 PROJECT WORK

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

a) For hardware projects, practical verification of the design, PCB design, fabrication, design analysis and testing shall be done.
b) 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.
c) .Integration of hardware and software, if applicable, shall be carried out.
d) .A detailed project report in the prescribed format shall be submitted at the end of the semester.
e) All test results and relevant design and engineering documentation shall be included in the report
f) .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.

a) . Presentation of the work .
b) Oral examination
c) Demonstration of the project against design specifications .
d) Quality and Content of the project report

Guidelines for evaluation:

Regularity and progress of work	30
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 he evaluated by the respective project guide and the project Coordinator based on Continuous evaluation. (iii)-(v) to he evaluated by the final evaluation team Comprising of 3 internal examiners including the project guide.

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EI 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 examiner shall evaluate the students in terms of their conceptual grasp of the course of study and practical/analysis skills in the field.