SCHEME OF EXAMINATION & SYLLABI

ELECTRONICS & COMMUNICATION ENGG.

B. Tech. Degree Course of

CALICUT UNIVERSITY

2004

ADMISSION ONWARDS

COMBINED FIRST AND SECOND SEMESTER

Code	Subject	Hours/Wee			Sess	Uni./Exam	
		L	T	P/D		Hrs	Marks
EN04 101	Engineering Mathematics I	3	-	-	50	3	100
EN04 102	Engineering Mathematics 11	3	-	-	50	3	100
EN04 103A(P)	Engineering Physics(A)	2	-	-	50	3	100
EN04 103A	Physics Lab(A)	-	-	1	25	-	-
EN04 104A	Engineering Chemistry(A)	2	-	-	50	3	100
EN04104A(P)	Chemistry Lab(A)	-	-	1	25	-	-
EN04 105	Humanities	2	-	-	50	3	100
EN04 106A	Engineering Graphics(A)	1	-	3	50	3	100
EN04 107A	Engineering Mechanics(A)	2	1	-	50	3	100
EC04 108	Basic Electronics	2	-	-	50	3	100
EC04 109	Basic Electrical Engineering	2	-	-	50	3	100
EC04 110(P)	Mechanical Workshop	-	-	3	50	-	-
EC04 111P)	Electrical and Electronics Workshop	-	-	2	50	-	-
	TOTAL	19	1	10	600	-	900

Note : Details of Common Course

SL NO.	SUBJECT CODE	NAME OF SUBJECT	COMMON FOR
1	EN04-10I	MATHEMATICS-1	COMMON FOR ALL.
2	ENO4-102	MATHEMATICS-II	COMMON FOR ALL.
3	ENO4-103A ENO4-103A(P) ENO4-103B EN04-103B(P)	ENGINEERING PHYSICS(A) PHYSICS LAB(A) ENGINEERING PHYSICS(B) PHYSICS LAB*(B)*	Al, S,EE,EC, IT,IC,BM,BT, PT AI,EE,EC,1C,BM,BT CH,CE,ME,PE CH,CE.ME,PE
4	EN04-104A EN04-104A(P) EN04-104B EN04-104B(P} ENO4-104C EN04-104C(P)	ENGINEERING CHEMISTRY(A) CHEMISTRY LAB(A) ENGINEERING CHEMISTRY(B) CHEMISTRY LAB(B) ENGINEERING CHEM1STRY(C) CHEMISTRY LAB(C)	AI,CS,EE,EC,IT,IC,BM,B T,PT AI,EE,BC,IC,BM,BT CE,ME,PE CE,ME,PE CH
5	EN04-105	HUMANITIES	COMMON FOR ALL
6	EN04-106A EN04-106B	ENGINEERING GRAPHICS(A) ENGINEERING GRAPHICS(B)	AI,CS,EE,IT,IC,PT,BM,B T CE,CH,ME,PE
7	EN04-107A EN04-107B	ENGINEERING MECHANICS(A) ENGINEERING MECHANICS(B)	AI,CH,CS,EE,EC,IT,IC,B M,BT,PT CE.ME.PE
8	EC04-108 CS04-108	BASIC ELECTRONICS COMPUTER PROGRAMMING IN C	EC,BM,BT,AI,IC CS. IT. PT
9	EE04-I09 CS04-109	BASIC ELECTRICAL ENGINEERING BASIC ELECTRICAL ENGINEERING	AI,EE,EC,IC,BM,BT, CS,IT.PT
10	EE04-110(P) EC04-110(P)	CIVIL AND MECHANICAL WORKSHOP MECHANICAL WORKSHOP	EE,CS,IT,PT EC,A1,BT,BM,IC
11	EEO4-111(P)	ELECTRICAL AND ELECTRONICS WORKSHOP	EE,EC,AI,BT,BM,CS, IT,IC,PT

THIRD SEMESTER

Code	Subject	Hours/Week			Session Marks	University Exam	
		L	T	P/D		Hrs	Marks
EN04 301A	ENGINEERING MATHEMATICS-III	3	1	-	50	3	100
EC04 302	COMPUTER PROGRAMMING IN C	2	-	2	50	3	100
EC04 303	ELECTRIC CIRCUITS & NETWORK THEORY	3	1	-	50	3	100
EC04 3O4	ELECTRICAL ENGINEERING	3	1	-	50	3	100
EC04 305	ELECTRONIC CIRCUITS I	3	1	-	50	3	100
EC04 306	SOLID STATE DEVICES	3	1	-	50	3	100
EC04 307(P)	**BASIC ELECTRONICS LAB**	-	-	3	50	3	100
EC04 308(P)	**ELECTRICAL ENGINEERING LAB**	-	-	3	50	3	100
	TOTAL	**17**	**5**	**8**	400	**-**	**800**

FOURTH SEMESTER

Code	Subject	Hours/Week			Session Marks	University Exam	
		L	T	P/D		Hrs	Marks
EN04 401A	ENGINEERING MATHEMATICS - IV	3	1	-	50	3	100
ENO4 402	ENVIRONMENTAL STUDIES	3	1	-	50	3	100
EC04 403	DIGITAL ELECTRONICS	3	1	-	50	3	100
ECO4 4O4	COMPUTER ORGANISATION AND ARCHITECHTURE	3	1	-	50	3	100
ECO4 405	ELECTRONIC CIRCUITS II	3	1	-	50	3	100
EC04 406	ANALOG COMMUNICATIONS	3	1	-	50	3	100
EC04 407(P)	**ELECTRONICS CIRCUITS LAB**	-	-	3	50	3	100
EC04 408(P)	**DIGITAL ELECTRONICS LAB**	-	-	3	50	3	100
	TOTAL	**18**	**6**	**6**	**400**	**-**	**800**

FIFTH SEMESTER

Code	Subject	Hours/Week			Session Marks	University Exam	
		L	T	P/D		Hrs	Marks
EC04 501	Signals and Systems	3	1	-	50	3	100
EC04 502	Mechanical Engineering	3	1	-	50	3	100
EC04 503	Linear Integrated Circuits	3	1	-	50	3	100
EC04 504	Electromagnetic Field Theory	3	1	-	50	3	100
EC04 505	Electronic Instrumentation	3	1	-	50	3	100
EC04 506	Micro Processors &	3	1	-	50	3	100
EC04 507(P)	**Linear Integrated Circuits Lab**	-	-	3	50	3	100
EC04 508(P)	**Analog Communication Lab**	-	-	3	50	3	100
	TOTAL	**18**	**6**	**6**	**400**	**-**	**800**

SIXTH SEMESTER

Code	Subject	Hours/Week			Session Marks	University Exam	
		L	T	P/D		Hrs	Marks
EC04 601	Engineering Economics and Principles of Management	3	1	-	50	3	100
EC04 602	Digital Signal Processing	3	1	-	50	3	100
EC04 603	Control Systems	3	1	-	50	3	100
EC04 604	Digital Communication	3	1	-	50	3	100
EC04 605	Power Electronics	3	1	-	50	3	100
EC04 606	Radiation and Propagation	3	1	-	50	3	100
EC04 607(P)	**Microprocessor Lab**	-	-	3	50	3	100
EC04 608(P)	**Mini Project**	-	-	3	50	-	-
	TOTAL	**18**	**6**	**6**	**400**	**-**	**700**

SEVENTH SEMESTER

Code	Subject	Hours/Week			Session Marks	University Exam	
		L	T	P/D		Hrs	Marks
EC04 701	Information Theory and Coding	3	1	-	50	3	100
EC04 702	Microwave Devices and Communication	3	1	-	50	3	100
EC04 703	Optical Communication Systems	3	1	-	50	3	100
EC04 704	Computer Communication Networking	3	1	-	50	3	100
EC04 705	Elective I	3	1	-	50	3	100
EC04 706(P)	**Digital Communication Lab**	-	-	3	50	3	100
EC04 707(P)	**Seminar**	1	-	3	50	-	-
EC04 708(P)	**Project Work**	-	-	3	50	-	-
	TOTAL	**16**	**5**	**9**	**400**	**-**	**600**

ELECTIVE – 1

A Software Engineering
B Image Processing
C Management Information Systems
D Satellite communication Systems
E Digital MOS Circuits
F Numerical Analysis.

EIGHTH SEMESTER

Code	Subject	Hours/Week			Session Marks	University Exam	
		L	T	P/D		Hrs	Marks
EC04 801	Microelectronic Technology	3	1	-	50	3	100
EC04 801	Wireless Mobile Communication Systems						
EC04 803	Communication Switching Systems	3	1	-	50	3	100
EC04 804	Elective-II	3	1	-	50	3	100
EC04 805	Elective-III	3	1	-	50	3	100
EC04 806(P)	**Advanced communication Lab**	-	-	3	50	3	100
EC04 807(P)	**Project Work**	-	-	7	50	3	100
EC04 808(P)	**Viva Voce**	-	-	-	-	-	100
	TOTAL	**15**	**6**	**6**	**400**	**-**	**700**

AGGREGATE FOR EIGHT SEMESTERS: 8300 3000 5300

ELECTIVE – II

A DSP Controllers
B Industrial Psychology
C Analog MOS Circuits
D Digital System Design
E Biomedical Instrumentation
F Multimedia Communication Systems

ELECTIVE – II

A Softy Computing Techniques
B Speech Processing
C Entrepreneurship
D Television Engineering and RADAR Systems
E Nano Technology
F Internet Technology.

EN04- 101: MATHEMATICS I

(Common for all B. Tech. programmes)

3 hours lecture per week

Module I: Differential Calculus (15 hours)
Indeterminate forms - L' hospital's rule - radius of curvature - centre of curvature -evolute - unctions of more than one variable - idea of partial differentiation - Euler's theorem for homogeneous functions - chain rule of partial differentiation - applications in errors and approximations - change of variables - Jacobians - maxima and minima of functions of two - method of Lagrange multipliers.

Module II: Infinite Series **(15 hours)**
Notion of convergence and divergence of infinite series - ratio test - comparison test - Raabe's test - root test - series of positive and negative terms - absolute convergence - test for alternating series - power series - interval of convergence - Taylors and Maclaurins series expansion of functions - Leibnitz formula for the n^{th} derivative of the product of two functions - use of Leibnitz formula in the Taylor and Maclaurin expansions

Module III: Matrices (21 hours)
Rank of a matrix - reduction of a matrix to echelon and normal forms - system of linear equations - consistency of linear equations - Gauss' elimination -homogeneous linear equations - fundamental system of solutions - solution of a system of equations using matrix inversion - Eigen values and eigen vectors - Cayley-Hamilton theorem - Eigen values of Hermitian, skew-Hermitian and unitary matrices- Diagonalisation of a matrix using Eigen values and Eigen vectors- quadratic forms- matrix associated with a quadratic form- definite, semidefmite and indefinite forms.

Module IV: Fourier series and harmonic analysis (15 hours)
Periodic functions - trigonometric series - Fourier series - Euler formulae - even and odd functions - functions having arbitrary period - half range expansions -approximation by trigonometric polynomials - minimum square error - numerical method for determining Fourier coefficients - harmonic analysis.

Reference books

1. Michael D. Greenberg, Advanced Engineeing Mathematics(second edition), - Pearson Education Asia.
2. Wylie C.R. and L.C. Barrent, *Advanced Engineering Mathematics,* McGraw Hill
3. Kreyszig E., *Advanced Engineering Mathematics,* Wiley Eastern
4. PiskunovN., *Differential and Integral calculus,* MIR Publishers
5. Ayres F., *Matrices,* Schaum's Outline Series, McGraw Hill
6. Sastry, S.S., Engineering Mathematics-Vol. 1 and2., Prentice Hal! of India.

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.

Total marks = 50

University examination pattern

QI - 8 short type questions of 5 marks, 2 from each module
QII - 2 questions A and B of l5 marks from rnodule 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
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of I5 marks from module IV with choice to answer anyone.

EN04 -102: MATHEMATICS II

(Common for all B. Tech. programmes)

3 hours lecture per week

Module I: Ordinary differential equations (21 hours)

Equations of first order - separable, homogeneous and linear types - exact equations - orthogonal trajectories - linear second order equations -homogeneous linear equation of the second order with constant coefficients -fundamental system of solutions -Solutions of the general linear equations of second order with constant coefficients- method of variation of parameters - Cauchy's equation - simple applications of differential equations in engineering problems, including problems in mechanical vibrations, electric circuits and bending of beams.

Module II: Laplace transforms (15 hours)

Gamma and Beta functions - definitions and simple properties - Laplace transform -inverse transform - Laplace transform -shifting theorems-Transforms of derivatives and integrals - differentiation and integration of transforms - transforms of unit step function and impulse function - transform of periodic functions - solution of ordinary differential equations using Laplace transforms.

Module III: Vector differential calculus (15 hours)

Vector function of single variable - differentiation of vector functions – scalar and vector fields - gradient of a scalar field - divergence and curl of vector fields - their physical meanings - relations between the vector differential operators.

Module IV: Vector integral calculus (15 hours)

Double and triple integrals and their evaluation - line, surface and volume integrals - Green's theorem - Gauss' divergence theorem - Stokes' theorem (proofs of these theorems not expected) - line integrals independent of the path.

Reference books

1. Michael D. Greenberg, Advanced Engineering Mathematics(second edition), Pearson Education Asia.
2. Wylie C.R. and L.C. Barrent, *Advanced Engineering Mathematics,* McGraw Hill
3. Kreyszig E., *Advanced Engineering Mathematics,* Wiley Eastern
4. Piskunov N., *Differential and Integral calculus,* MIR Publishers
5. Ayres F., *Matrices,* Schaum's Outline Series, McGraw Hill
6. Sastry, S.S., Engineering Mathematics-Vol.1 and2., Prentice Hall of India

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50.

University examination pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 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
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EN04- 103A: ENGINEERING PHYSICS(A)

(common for AI, CS, EE, EC, IT, IC, BM,BT, PT)

2 hours lecture per week

Module I (11 hours)

Semi conductor Physics- Formation of energy bands in solids- Classification of solids on the basis of energy band gap-Intrinsic and extrinsic semiconductors-Elemental and compound Semiconductors- Fermi level in intrinsic semiconductor- Electron and hole concentrations in intrinsic semi conductor in thermal equilibrium- Law of mass action-Electrical conductivity of intrinsic semiconductor- Fermi level in n-type and p-type semiconductors- Electrical conductivity of extrinsic semi conductor- Diffusion and total current. Application of semi conductors- Band model of p-n junction- Junction diode and its characteristics- characteristics of a transistor in common emitter configuration-Input, output resistance and current amplification factor- Light emitting diode, photo diode, solar cell, photo resistor (LDR),photo transistor, liquid crystal display(LCD) and zener diode- Avalanche and zener breakdown- Application of zener diode as a voltage regulator. Hall effect in semiconductors- Derivation *of* Hall coefficient- Determination of Hall coefficient by measuring Hall voltage-Applications of Hall effect Super conductivity-Properties of superconductors (critical magnetic field, Meisnner effect, critical current, flux quantisation)- Types of super conductors- BCS theory of super conductivity (qualitative) - Josephon's effect- Theory of d.c. Josephon's effect- SQUID - Applications of super conductivity.

Module II (11 hours)

Interference of light- Interference due to division of amplitude- Interference from plane parallel thin films- Colours of thin films in reflected and transmitted light- Newton's rings- Measurement of wavelength and refractive index- Thin wedge shaped film- Air wedge- Testing of optical planeness of surfaces. Interferometry- Michelson's interferometer-Types of fringes-Visibility of fringes-Application of Michelson's interferometer in determination of wavelength of monochromatic light, resolution of spectral lines and refractive index of gases. Diffration of light-Introduction of Fresnel and Fraunhoffer class of diffraction and their distinction- Fresnels diffraction and rectilinear propogation of light-Diffraction pattern due to straight edg and expression for intensity maximum and minimum- Fraunhoffer diffraction -Simple theory of diffraction grating, its construction and working- Rayleigh's criteria, for resolution of spectral lines- Resolving power and dispersive power of grating.

Module III (11 hours).

Poarisation of light- Double refraction- Huygen's explanation of double refraction in uniaxial crystals-Positive and negative crystals- Nicol prism, construction and working -Quarter and half wave plates- Theory of circularly and elliptically polarised light, their production and detection- Rotatory polarisation- Laurent's half shade (brief explanation)- Laurent's half shade polarimeter- Applications of polarised light. Laser physics- Basic concepts and properties of laser- Spontaneous and stimulated emission- Expression for ratio of their coefficients-Absorption,- population inversion and optical pumping-Construction and components of a laser-Ruby,Helium and Neon and semiconductor lasers-Applicattion of lasers. Basic principle of holography and its application.Fibre optics- Basic principle -fibre dimensions and construction- Step index single mode and multi mode- fibre- Graded index fibre-Numerical aperature and acceptance angle- Signal distortion in optical fibres and transmission losses(brief ideas only)- optic fibre communication (block diagram) and it's advantages-Applications of optic fibres.

Module IV (11 hours).

Planck's quantum theory- Absorbing power, reflecting power and transmitting power of a body or surface- Perfect black body- Distribution energy in the spectrum of a black body- Wein's displacement law- Planck's hypothesis-Derivation of Planck's law of radiation. Quantum mechanics- Distinction between Newtonian and quantum mechanics- Schroedinger wave equation for free particle -Potential in schrodinger equation -Time dependant and time independent schroedinger equations and their derivations- Expectation values-Applications- Particle in a box (motion in one dimension).Ultrasonics- Piezo - electric effect- Piezo electric crystal- Production of ultrasonics by piezo-electric oscillater- Detection of ultrasonics - General properties and applications of ulltrasonics - Ultrasonic diffractometer and determination of velocity of ultrasonics in a liquid.

Text books

1. Sreenivasan M .R, *Physics for Engineers,* New Age International
2. Vasudeva A.S; *Modern Engineering Physics,* S. Chand
3. S.O. Pillai, *Solid state physics,* New Age International

Reference books

1. Tyagi, M.S. *Introduction to semi conductor materials and* devices, John Wiley and Sons
2. Mayer, *Intoduction to classical and modern optics,* Arendt
3. John Senior, *Fibre optic communiction*
4. G Aruldhas *Quantum mechanics* Prentice Hall of India
5. Murukesan R. *Modern Physics* —S.Chand and Co
6. Brijlal and Subrahmanyam N, *Text book of Optics,* S. Chand
7. Kale Gokhale;. *Fundamentals of Solid State Electronics,* Kitab Mahal
8. Gupta S.L. and Kumar, V; *Solid State Physics,* K.Nath.

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50.

University examination pattern

QI - 8 short type questions of 5 marks, 2 from each module
QII - 2 questions A and B of l5 marks from module I with choice to answer any one
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one

EN04- I03A(P): PHYSICS LAB(A)

(Common for AI,EE, EC. IC,BM)

1 hour lab per week or 2 hours lab per alternate weeks

1. Band gap energy in a semi conductor using a reverse biased p-n junction.
2. Static characteristcs of a transistor (p-n-p or n-p-n)in common emitter configuration
3. Characteristics of a Zener diode
4. Characterisitics of a LED.and wave length of emitted radiation
5. Characterisitc of a photo diode.
6. Characteristic of a photo resistor (LDR)
7. Voltage regulation using Zener diode
8. Wavelength of mercury spectral lines using diffraction grating and spectrometer.
9. Refractive indices of ordinary and extra ordinary rays in calcite or m quarts prisms.
10. Wave length of sodium light by Newton's rings method.
11. Diameter of a thin wire or thickness of a thin paper by air wedge method.
12. Specific rotatory power of cane sugar solution using polarimeter.
13. Frequency of an electrically maintained tuning fork(transverse and longitudinal mode)
14. Wave length and velocity of ultrasonic waves using ultrasonic difractometer.
15. Divergence of laser beams using He-Ne laser or diode laser.
16. Wave length of laser using transmission grating.
17. Resolving and dispersive power of a grating .
18. Wave length of a monochromatic light by straight edge using laser beam.
19. Characterics of a solar cell.
20. Planck's constant using photo-electric cell or solar cell
21. Hall coefficient by measuring Hall voltage in a semi conductor.
22. Measurement of numerical aperature , acceptance angle and attenuation in an optical fibre.
23. Measurement of displacements using optic fibre.
24. Michelson's inerfeometer- determination of wavelength of a monochromatic source, resolution of spectral lines and refractive index of a gas.

(Any 12 experiments should be done)

Reference Books:-

1. "Practical Physics with viva voice"- Dr. S.L.Guptha and Dr.V Kumar- Publishers- Pragati Prakashan.
2. "Experiments in Engineering Physics"- M.N. Avadhanulu, A.A.Dani, and R.M.Pokley- Publishers- S. Chand.

Internal work assessment

Lab practicals and record	= 15
Test/s	= 10
Total marks	= 25

EN04-104A: ENGINEERING CHEMISTRY(A)

(Common for AI, CS, EE, EC, IT, IC, BM, BT, PT)

hours lecture per week

SECTION-1

CHEMISTRY OF ENGINEERING MATERIALS:

Module 1(13 Hours)

Solids: Classification of solids with examples- (Crystalline - Polycrystalline -Amorphous - Partially melted solids - (KCN) - Super cooled liquids - (Glass) - liquid crystals.)

(1 Hour)

Crystalline state: Steno's law - Internal structure - Space lattices -Crystallographic axes- Law of rational indices-Crystal systems - Elements of symmetry - X-ray study- Braggs equation (derivation) single crystal and powder method -(Debye-Scherrer Camera) Cubic systems - structure elucidation -d_{100}: d_{110}: d_{111} ratio (problems to be worked out) - crystal imperfections(point-line-surface-volume -burgers vector- dislocations- edge and screw) Physical properties, bonding characteristics and Structure relation of- (Covalent solids - Ionic solids - metals) - metallic bonding- Stacking of atoms- (ABCABC....),(ABAB) - tetrahedral and octahedral voids-Alloys - Hume Rothery rule-Conductivity - Resistivity -(Free electron theory-explanation with Fermi - Diracstatistics)- Fermi level -Applications of conductors-(transmission lines-OFHC Copper, ACSR, Contact materials, Precision resistors- heating elements-Resistance thermometers)- Super Conductors (type I and II-examples)

(5 Hours)

Semi conductors - Band theory-(MOT) Valence band-Conduction band-intrinsic and extrinsic semiconductors-Fabrication of semiconductor materials-Crystal Growth-ultra pure Silicon production-zone refining-Fabrication of Integrated Circuits (IC)

(2 Hours)

Dielectric materials-Polarization - Ferro-electricity - Piezoelectricity - Applications with examples- Introduction to Nano Science -Carbon nano tubes and nanowires

(l Hour)

Non-crystalline state - glass - properties - (applications- conducting glasses - solid supported liquids (stationary phases in reverse phase chromatography) - Optical fibre.

(l Hour)

Liquid crystals- Characterization- Nematic phases-Smectic Phases-Cholesteric Phases-Columnar Phases- Chemical Properties-thermotropic-lyotropic-epitaxial- growth-Freedericksz transition-applications -Liquid crystal thermometers- LCD displays

(3 Hours)

Reference books

1. J. D. Lee (1996) "Concise Inorganic Chemistry" Chapman and Hall Ltd. London, pp-1032
2. S. Glasstone {1997) "Textbook of Physical Chemistry" Macmiilan, New Delhi, pp-1320
3. P. W. Atkins (1987) "Physical Chemistry" Oxford University Press, Oxford, pp-857.
4. P. W. Atkins and J. Depaula (2001)" Physical Chemistry" W.R Freeman and Co, pp-1000.
5. V. Raghavan (2000) "Material Science and Engineering-A First Course" Fourth edition, Prentice-Hall of India Pvt. Ltd, New Delhi, pp-485.
6. L.H. Van Vlack (1998) "Elements of Materials Science and Engineering" Sixth edition, Addison-Wesley, London pp-598.

7. J. W.Goodby (1997) "Chemistry of liquid crystals" VCH Publishing, pp-400.
8. K. W. KoIasinski (2002) "Surface Science: Foundations of Catalysis and Nano science" John-Wiley and Sons, pp-326.
9. K. J.Klaubunde (2001) "Nano scale Materials in Chemistry" Wiley-Interscience,pp-304.
10. J.l.Gersten and F. W.Smith (2001)" The Physics and Chemistry of Materials" Wiley-Interscience, pp-856.

Module 2 (13 Hours)

High Polymers and Lubricants- Classification of Polymers-(Natural and Synthetic, Organic and Inorganic, Thermoplasic and Thermosetting, Plastics, Elastomers, Fibres and liquid resins) Polymerization (Chain polymerization Polythene- PVC- Teflon -polystyrene -poly-methylmethacrylate) Condensation[1] polymerization(Polyamide and Polyesters) Co-polymerization (Buna-S, Buna-N, PVC- Co-polyvinylacetate, PAN-Co-poly vinyl Chloride),Coordination polymerization (Ziegler- Natta Polymerization)-Electrochemical Polymerization-Metathetical Polymerization-Group transfer Polymerization (3 Hours)

Mechanism of polymerization (Cationic, anionic, and free radical).Polymerization techniques (Bulk polymerization, Solution polymerization, Suspension polymerization, Emulsion polymerization, Melt polycondensation, Solution polycondensation, Interfacial condensation, Solid and Gas Phase Polymerization (2 Hours)

Structure relation to properties(Chemical resistance, Strength, Plastic deformation, Extensibility, Crystallinity) -Mol.Wt of Polymers-Number average Molecular wt, Weight average Mol.wt- Gel Permeation Chromatography (1 Hour)

Thermosetting resins (Bakelite, Urea-Formaldehyde, Silicones), Thermoplastic resins (Acrylonitrile, PVC, PVA ,PS, PMMA, PE).-Fibres (Nylon6, Nylon66, NyIon 6,10, Cellulose fibres, dacron, Kevlar) Application of polymers in electronic and electrical industry. Elastomers-Natural rubber-Structure- Vulcanization-Synthetic rubbers (Neoprene, Buna-S, Buna-N, thiokol, Silicone rubber) (3 Hours)

Compounding of Plastics (Fillers, Plasticizers, lubricants, pigments, antioxidants, Stabilizers) and Fabrication (Calendering, Die Casting, Film casting, Compression, injection, Extrusion and Blow moulding, Thermoforming, Foaming, Reinforcing) (1 Hour)

Lubricants: Theory of friction - mechanisms of lubrication -Fluid film or hydrodynamic, thin film or boundary lubrication, extreme pressure lubrication- Classification of Lubricants-(Liquid(animaI and vegetable oils, Petroleum oiIs),Semi-solid (Ca-soap grease, Li-soap grease, Al-soap grease, Axle grease) Solid lubricants (Graphite, Molybdenum di-sulphide-Structure relation to lubrication property) and synthetic lubricants (Di-basic acid esters, Poly glycol ethers, Organo phosphates, Organo silicones)). Properties of Lubricants (Viscosity index, Cloud point and pour point, flash point and fire point, Corrosion stability, Emulsification, Aniline point). Additives and their functions (Fatty acids, Sulphurised fats, Phenols, Calcium sulphonates, Organo-metallics, Hexanol, Amine phosphates, Tricresyl phosphates, Silicon polymers) (3 Hours)

Reference books

1. B.R.Gowarikeret.al (2002) "Polymer Science" New Age International pp-505
2. B.W.Gonser et.al (1964)" Modem Materials-advances in development and application" Vol 1- 7, Academic Press, New York.

Module - 3 (9 Hours)

Electrochemistry: Single Electrode potential (theory - Nernst equation, derivation from thermodynamic principles) - types of electrodes (M|M+; M|MA|A-, M|A^+, A+2, Pt|$H_{21}H^+$, Pt|CL|Cl-, Pt|0_2|OH" -glass electrode) Electrochemical cells-concentration cells-Salt bridge - Liquid junction potential- emf measurement - Poggendorf's compensation method- digital method - electrochemical series - over voltage - theory - application in corrosion control - Polarography- storage cells - lead acid, Ni/Cd, - Fuel cells - H_2/O_2 fuel cells(Bacon cell), Hydrocarbon/air fuel cell-Bio-chemical fuel Cell.

(5 Hours)

Acid- Bases - (Lowry-Bronsted and Lewis concepts - examples) - concept of pH - pH measurement- (instrumental details required) - Dissociation constants-Potentiometric titrations-(Neutralization, Oxidation-reduction, and Precipitation) Buffer solutions - Henderson's equation for calculation of pH.

(4 Hours)

Reference books

1 S.Glasstone(1997) "Text book of Physical Chemistry" Macmillan, New Delhi, pp-1320.
2 P.W Atkins(1987)"Physical Chemistry" Oxford University Press, Oxford, pp-857.
3 C.A. Hampel(Ed)(1964)'Encyclopedia of Electrochemistry" Reinhold Publishing Corpcenration, New York, pp-1206.
4 A. Standen (Ed)(1964) "Kirk - Othmr Encyclopedia of Chemical Technology " Vol. 3 John Wiley and Sons. lnc, New York, pp-925.

SECTION – 2

CHEMISTRY OF MATERIAL AND ENVIRONMENTAL DAMAGE

Module - 4 *(9* Hours) Material damages and prevention:

Corrosion - theoretical aspects -(electrochemical theory) - Galvanic series -Pourbiax diagram - assessment of corrosion potential of materials - Types of corrosion - Dry corrosion-direct chemical -Wet Corrosion-Electrochemical-differential aeration -Corrosion of Iron in acidic neutral, basic condition (Corrosion in boilers) - Galvanic corrosion-(corrosion at contact points in computers-Ag/Au)-Inter granular corrosion (18-8 Steel).Microbial corrosion-Factors influencing corrosion.

Corrosion protection-Self protecting corrosion products-Pilling-Bedworth rule-Coatings-Organic-(paints and polymers)-Inorganic Coatings-Galvanizing (dip coating, Sherardizing, Wire-gun method)-Tinning- ElectropIating-(Chromium, Nickel), Anodization of Aluminium- Passivation of metals by chemical treatment- Protection by Sacrificial Anode-Impressed current.

(4 Hours)

Environmental damages and prevention:

Pollution - Definitions - Classification of pollutants (Global, Regional, Local; Persistent and Non-persistent; Pollutants - Eg: CO_2, CO, SO_x, NO_x, VOC, SPM, CFC, POP, Dissolved metals) - effects on environments -Air pollution – Fossil fuel burning - Automobile exhausts - Photochemical smog - PAN, PBN formation-chemical equations required) - Stratospheric Ozone depletion- CFCs -Nomenclature CFCs -Chapman cycle of Ozone formation- CFC dissociation and its reaction with Ozone -Alternate refrigerants - Monitoring of pollution - gases (CO, SO_2,NO_X)and paniculate (High volume sampler) -Pollution from thermal

power plants - Coal composition- fly ash - Thermal pollution. Methods of control of Air pollution - Bag filters, cyclones, Scrubbing, ESP, Catalytic converters -composition and action with CO, NO_s. Water pollution- Pollutant Classification-(Organic, Inorganic, Suspended and Dissolved- Toxic metal waste- BOD-COD-) monitoring (analytical methods-brief discussion) and control -Waste water treatment-Aerobic, Anaerobic-USAB process-Industrial waste water treatment.- Soil pollution-Solid waste-radio nuclides-Toxic metals- monitoring and. control-Incineration-Dioxins- hazardous waste - deep-well injection

(5 Hours)

Reference books

1. L L Shreir (Ed) "Coirosion Control" Vol 1 and II Newnes-Butterworths, London.
2. C. A. Harnpel (Ed) "Encyclopedia of Electrochemistry' Reinhold Publishing corporation, pp-1206.
3. V Raghavan (2000) 'Material Science and Engineering – A First Course "Prentice-Hall of India Pvt. Ltd, New Delhi, pp-485.
4. A. K. De (I996), "Environmental Chemistry Newage International Pvt. Ltd., New Delhi pp-364.
5. 5 C.N. Sawyer and P. L. McCarty (1986) "Chemistry for Environmental Engineering" McGraw Hill Book Company, New Delhi – pp-530.
6. H. S. Peavy, D. R. Rowe and G.T. Chobangoglus(1985) "Environmental Engineering" MaGraw Hill International, pp-720.
7. S P Mahajan (1985) "Pollution Control in Process Industries " Tata McGraw Hill, New Delhi – pp-273.
8. S. E. Manahan (1975) "Environmental Chemistry" Willard Grant Press Boston, pp-532.

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50.

University examination pattern

QI - 8 short type questions of 5 rnarks, 2 from each module
QII - 2 questions A and B of l5 marks from module I with choice to answer any one
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one

EN04-104 A (P): CHEMISTRY LAB(A)

(Common for AI, EE, EC, IC, BM, BT)

1 hour lab per week or 2 hours lab per alternate weeks

List of Experiments

1. Estimation of purity of Copper (Iodometric method)
2. Estimation of purity of Alumiraum (EDTA method)
3. Crystal growth (melt growth, Solution.
4. Phenol formuldehyde-preparation and study of properties
5. Urea formaldehyde-preparation and study of properties.
6. Flash and fire point-Pensky--Martens apparatus.
7. Measurement of Single Electrode potential-Poggendorf s method (M|M+, M|MA| A-, Salt bridge preparation, Calculation of Junction potential) .
8. Corrosion potential measurement of certain metals and alloys in 3.5% salt solution (Steel) 18-8), Al, Cu, Brass, Bronze, Monel metal or any alloys of industrial use) - Potentiodynamic and Potentiostatic methods.
9. pHmeter-Calibration and measurement of pH-Preparation of pH by Henderson's equation and verification
10. Potentiometric titration of acid and base- plots of *E/V,* AFVAV; A2E/AV2plots.
11. Electrodepostion-plating of Copper-detection of the thickness of the layer deposited. Anodizing of Aluminium--Characteristics of the coating.
12. Estimation of SO2, NO2, H2, S2, Calculation of concentration in ppm and microgram per M^3 and comparison ofdatawith permitted levels.
13. Estimation of Pb, Cd in water-colourimetric method
14. Estimation of fluoride (Alizarind method) NItrate in water-colourimetric method
15. Estimation of Dissolved oxygen (Winklers method)
16. Identification tests for certain common plastics (PE, PVC, Nylon, PET, etc.).
17. Preparation of some liquid crystals and study of their properties.

(Atleast 12 experiments should be done)

Internal work assessment

Lab practicals and record = 10 + 5

(Lab performance to be evaluated by the thoroughness of the procedure and practices, results of each experiment and punctuality in the submission of Rough and Fair Records)

Test/s = 10

Total Marks = 25.

EN04 - 105: HUMANITIES

(Common for all B. Tech. programmes)

2 hours lecture per week

Module I (10 hours) Introduction to English usage and grammar-
Review of grammar affixes, prefixes, suffixes, participles and gerunds -transformation of sentences - commonly misspelt words - correction of mistakes - punctuation - idioms - style - vocabulary building.

Reading comprehension -
Exposure to a variety of reading materials, articles, essays, graphic representation, journalistic articles, etc..

Writing comprehension-
Skills to express ideas in sentences, paragraphs and essays.

Module II (10 hours) Technical communication and report writing
Need, importance and characteristics of technical communication -correspondence on technical matters-aspects of technical description of machinery, equipment and processes - giving instructions in an industrial situation - note taking and note making - correspondence on technical topics -different types of technical reports

Module III (14 hours) History of science and technology
Science and technology in the primitive society - the development of human civilization from primitive to modern society- impact of sciences and technology on societies - Cultural and industrial revolutions - the rise and development of early Indian science - contribution of Indian scientist-JC Bose CV Raman Visweswaraya-Ramanujam and Bhabha- Gandhian concepts-recent advances in Indian science.

Module IV (10 hours) Humanities in a technological age
Importance of humanities to technology, education and society - relation of career interests of engineers to humanities - relevance of a scientific temper -science, society and culture.

Reference Books:

1. Huddleston R., English Grammer - An outline, Cambridge University Press
2. Pennyor, Grammar Practice Activities, Cambridge University Press
3. Murphy, Intermediate English Grammar, Cambridge University Press
4. Hasgemi, Intermediate English Grammar – Supplementary Exercise with answer" Cambridge University Press.
5. Vesilind; Engineering Ethics and the Environment, Cambridge University Press.
6. Larson E; History of Inventions, Thompson Press India Ltd..
7. Bemal J.D., Science in History, Penguin Books Ltd.
8. Dampier W.C., History of Science", Cambridge University Press.
9. Encyclopedia Britannica, History of Science, History of Technology.
10. Subrayappa; History of Science in India, National Academy or Science, India.
11. Brownoski J., Science and Human Values, Harper and Row.
12. Schrodinger, Nature and Greeks and Science and Humanism, Cambndge University Press.

13. Bossel, H, Earth at a Crossroads - paths to a sustainable Future, Cambridge University Press.
14. McCarthy, English Vocabulary in Use, Cambridge University Press.
15. Anna University, English for Engineers and "Technologists, Orient Longman.
16. Meenakshi Raman etal, Technical Communication-Principles and practice. Oxford University Press.

Internal work assessment

One essay on relevant topic		10
One Technical Report		10
2 Tests	2x15	= 30
Total marks		= 50.

University examination pattern

QI - 8 short type questions of 5 rnarks, 2 from each module
QII - 2 questions A and B of l5 marks from module I with choice to answer any one
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one

EN04 - 106A: ENGINEERING GRAPHICS(A)

(Common for AI, CS, **EE,** EC, IT, IC, PT, BM,PT)

1 hour lecture and 3 hours drawing

Module-0 (8 Hours -1 Drawing exercise)

Drawing instruments and their use - different types of lines - lettering and dimensioning - familiarization with current Indian Standard Code of practice for general engineering drawing. Construction of ellipse, parabola and hyperbola. Construction of cycloid, involute and helix. Introduction to Computer Aided Drafting. (For practice only, not for University Examination).

Module - 1 (12 Hours - 3 drawing exercises)

a) Introduction to orthographic projections - vertical, horizontal and profile planes - principles of first angle and third angle projections. Projections of points in different quadrants. Orthographic projections of straight lines parallel to one plane and inclined to the other plane - straight lines inclined to both the planes and occupied in one quadrant- traces of lines.

b) True length and inclination of a line with reference planes. Line occupied in more than one quadrant. Line inclined to the two reference planes but parallel to the profile plane. line dimensioned in surveyor's unit.

Module - II (16 Hours - 3 drawing exercises)

a) Projections of plane laminae of geometrical shapes parallel to one plane and inclined to the other plane - plane laminae inclined to both the planes. Auxiliary projections of plane laminae. Projections of laminae inclined to the two reference planes but perpenticular to the profile plane.

b)Projections of polyhedra and solids of revolution - frustums - projections of solids with axis parallel to one plane and inclined to the other plane. Projections of solids with the axis inclined to both the planes.(Solids to be drawn : Cube, prisms, pyramids, tetrahedron, cone, and cylinder.) Projections of solids on auxiliary planes. Projections of combinations of solids. (Solids to be drawn : Prisms, pyramids, tetrahedron, cube, cone, and sphere).

Module-III (12 Hours - 3 drawing exercises)

a) Sections of solids - sections by planes parallel to the horizontal or vertical planes and by planes inclined to the horizontal or vertical planes. True shape of section by projecting on auxiliary plane, (Solids to be drawn : Cube, prisms, pyramids, tetrahedron, cone, and cylinder.)

b) Development of surfaces of solids - method of parallel line, radial line, I triangulation and approximate developments. Development of polyhedra, cylinder, cone, and sectioned solids. Development of solids having hole or cut.

Module-IV (12 Hours - 3 drawing exercises)

a) Introduction to isometric projection - isometric scale - isometric views - isometric projections of prisms, pyramids, cylinder, cone, spheres, sectioned solids and combinations of them. Principle of oblique projection - cavalier, cabinet and general oblique projections of solids and simple objects.

b) Introduction to perspective projections - Classification of perspective views - parallel, angular and oblique perspectives - visual ray method and vanishing point method of drawing perspective projection- perspective views of prisms, pyramids and circles.

Module-V (12 Hours - 6 drawing exercises)

a) Introduction to multiview projection of objects - the principle of the six orthographic views - convertion of pictorial views of simple engineering objects into orthographic views.

b) Conventional representation of threaded fasteners. Drawing of nuts, bolts, washers and screws. Locking arrangements of nuts. Bolted and Screwed joints. Foundation bolts of eye end type, hook end type and split end type.

NOTE: All drawing exercises mentioned above are for class work. Additional exercises where ever necessary may be given as home assignments.

Text books

1. John K.C., Engineering Graphics, Jet Publications
2. P.I. Varghese, Engineerng (Graphics, VIP Publications'
3. Bharr N.D., Elementary Engineering Drawing, Charotar Publishing House.

Reference books

4. LuzadderW. J., Fundamentals of Engineeiing Drawing, Prentice Hall of lndia.
5. Narayanana K. I. and Kannaiiah P, Engineering Graphis, Tata McGraw Hill.
6. Gill P. S., Geomatrical Drawing , Kataria and sons.

Internal work assessment

Drawing exercises (Best 10)	10x3	= 30
2 Tests	2x10	= 20
Total marks		= 50

University examination pattern

No questions from module 0
QI - 2 questions A and B of 20 marks from module I with choice to answer any one
QII- 2 questions A and B of 20 marks from module II with choice to answer any one
QIII- 2 questions A and B of 20 marks from module III with choice to answer any one
QIV- 2 questions A and B of 20 marks from module IV with choice to answer any one
QV - 2 questions A and B of 20 marks from module I with choice to answer any one

EN04 - 107A: ENGINEERING MECHANICS(A)

(Common for AI, CH, CS, EE, EC, IT, IC, BM, BT, PT)

2 hours lecture and 1 hour tutorial per week

Objectives

1. To acquaint the student with general methods of analyzing engineering problems
2. To illustrate the application of the methods to solve practical engineering problems

Module I (17 hours)

Principles of statics - Free body diagrams - Coplanar forces and Force systems -Resultant and equilibrium conditions for concurrent, parallel and general system of forces - Solution of problems by scalar approach. Introduction to vector approach (Application to simple problems only) - Concurrent forces in space - Resultant - Equilibrium of a particle in space - Non-concurrent forces in space - Resultant of force systems.

Module II (17 hours)

Friction - Laws of friction - Simple contact friction problems - Wedge - Screw jack and its efficiency.

Properties of surfaces - First moment and centroid of curve and area - Centroid of composite plane figures - Theorems of Pappus-guldinus- Second moments of plane figures and composite sections - Transfer theorems - Polar moment of area - Product of area and Principal axes (conceptual level treatment only).

Moment of inertia of a rigid body - M.I of a lamina - M.I of 3 dimensional bodies (cylinder, circular rod, sphere).

Module III (17 hours)

Introduction to structural mechanics - Different types of supports, loads and beams - Reactions at supports. Shear force and Bending moment in beams -Shear force and bending moment diagrams for cantilever and simply supported beams (only for concentrated and uniformly distributed load cases).

Plane trusses - Types of trusses (Perfect, Deficient and Redundant trusses) -Analysis of trusses - Method of joints - Method of sections.

Module IV (15 hours)

Kinetics of rectilinear motion - Newton's second law- D'Alembert's principle -Motion on horizontal and inclined surfaces - Analysis of lift motion - Motion of connected bodies. Curvilinear motion - Equation of motion - Tangential and normal acceleration - Centripetal and centrifugal forces - Motion of vehicles on circular path.

Work, Power and Energy - Work done by a force - Work of the force of gravity and force of spring - Work-energy equation - Transformation and conservation of energy - Applications to problems.

Kinematics of rotation - Rigid body rotation about a fixed axis - Rotation under the action of constant moment.

Introduction to mechanical vibrations - Simple harmonic motion- free vibration - Oscillation of spring - Torsional vibration.

Text Books

1. Timoshenko and Young, "Engineering Mechanics", McGraw Hill Publishers
2. Hibbeler, Engineering Mechanics, Vol.1 statics, Vol II Dynamics, Pearson
3. Shames, I.H., "Engineering Mechanics- Statics and Dynamics", Prentice Hall of India.

Reference Books

1. Beer, F.P. and Johnson, E.R., "Mechanics for Engineers- Statics and Dynamics", McGraw Hill Publishers.
2. Rajasekharan and Sankarasubramanian, "Engineering Mechanics", Vikas Publishing House.

Internal work assessment

60%- Test papers (minimum)
30%- assignment should be computer based using spread sheet or suitable tools)
Total marks = 50

University examination pattern

QI - 8 short type questions of 5 marks, 2 from each module (in which atleast 5 questions to be Numerical)
QII - 2 questions A and B of 15 marks from module! with choice to answer anyone
QIII -2 questions A and B of 15 marks from module III with choice to answer any one
QIV - 2 questions A and B of l5 marks from module III with choice to answer any one.
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one
(QII to V can have subdivisions and at least 80 % weightage for numerical problems)

EC04 -108 BASIC ELECTRONICS

(Common for EC, BM, BT, AI, IC)

2 hours lecture per week

Module - l (Hours 10)

Electron ballistics - Motion of electron in Electric field - Two dimensional motion of electrons in uniform electric field- motion of electron in transverse magnetic filed- Electron motion in parallel electric and magnetic fields- Electron motion in perpendicular electric and magnetic field. Electrostatic and magnetic deflection sensitivities. CRO- Principle, CRT, block diagram of CRO. Magnetic focusmg-electrostatic focusing, applications of CRO.

Multimeter-principle of measurement of voltage, current and resistance. Vacuum diode, triode and pentode- principles of operation only.

Module 2 (Hours 12)

Electronic components (Brief discussion only-construction aspects not required). Resistors-fixed and variable, different types, characteristics, colour coding and tolerance. Capacitors-fixed and variable, different types, characteristics. Inductors, Relays and trans formers-different types.

The ideal diode- terminal characteristics of practical diodes- analysis of diode circuits-DC model of the diode- Zener diodes- clipping and clamping circuits Transistors- Physical structure and modes of operation- graphical representation of transistor characteristics- DC equivalent model and analysis- The three configuration- comparison and basic applications- Junction filed effect transistors- structural features, operation and VI characteristics.

Module 3 (Hours 10)

Graphical analysis of BJT operations- Biasing- load line, Q-point-effect of Q-point location on allowable signal swing- different resistor biasing circuits-various biasing technique- using two DC sources- potential divider biasing, collector feed back biasing- Bias stability- definition of stability factors-calculation of stability factor for potential divider biasing circuit.

Module 4 (Hours 12)

Rectifiers and power supplies - Half wave and full wave rectifiers. Definition and derivation of rectifier specifications such as PIV, DC output voltage, ripple factor, efficiency, rectification factor- rectifiers with filter: Inductive filter-analysis capacity filter- LC and pi filters.

Simple Zener regulator - working - analysis and design - Series voltage regulator - analysis and design.

Text Books

1. Milman, J. and Halloas, C. Electronic Devices and Circuits, Tata McGraw Hill.
2. Add S. Sedra and Kenneth C Smith, Microelectronic

Reference books

1. Boylestad, R and Nashelsky, L Electronic Devices and Circuit Theory, PHI/Pearson
2. Boggart T.F. Electronic Devices and Circuits, UBS.
3. Horenstein, M. N. Micro Electronics Circuits, PHI.

Internal work assessment

60% - Test papers (minimum 2)
30% - Assignments / Term project/any other mode decided by the teacher.
10% - Other measures like Regularity and Participation' in Class
Total marks = 50

University Examination Pattern

QI - 8 short questions of 5 marks, 2 from each module
QII - 2 questions A and B of 15 marks from module I with choice to answer any one
QIII- 2 questions A and B of I5 marks from module I with choice to answer any one QIV- 2 questions A and B of 15 marks from module I with choice to answer any one
QV- 2 questions A and B of 15 marks from module I with choice to answer any one.

EC04 -109 BASIC ELECTRICAL ENGINEERING

(Common for EE, EC, AI, IC, BM, BT, PT)

2 hours lecture per week.

Module 1(10 hours)

Elementary concept and definitions of current, voltage, power and energy -Introductory circuit analysis - Independent voltage and current sources-Dependent voltage and current sources - Source transformation – Ohm's law-Kirchoff 's laws -Solutions of simple series, parallel and series-parallel circuits with DC excitation - Solutions of resistive circuits with dependent sources -Mesh analysis and Nodal analysis - Nodal conductance matrix and mesh resistance matrix.

Basic network theorems - Linearity - Concept of a linear element - Concept of a linear circuit - Passive vs. active elements - Bilateral & unilateral elements -Thevenin's theorem - Norton's theorem - Superposition theorem - Substitution theorem- Maximum power transfer theorem.

Module II (12 hours)

Magnetic circuits - MMF - Magnetic flux - Reluctance - Comparison of magnetic and electric circuits - Magnitisation curves of ferromagnetic materials - Solution of magnetic circuits.

Faraday's laws of electromagnetic induction - Lenz's law - Dynamically and statically induced emfs - Self and mutual inductances - Inductances in series and parallel - Mutual flux and leakage flux - Coefficient of coupling - Dot convention- Cumulative and differential connection of coupled coils.

Electostatics - Capacitance- Parallel plate capacitor - Capacitors in series and parallel - Charging and discharging of capacitor - Energy stored in electrostatic fields - potential gradient - Dielectric strength.

Two terminal element relationships - V-I relationship for inductance and capacitance.

Time domain analysis of circuits - Linier differential equations for series RL and RC, parallel RL and RC, series RLC and parallel RLC circuits - Complete solution for step/dc, voltage/current inputs - Natural response - Transient response -Time constant - Rise and fall times - Determination of initial conditions.

Module III (12 hours)

Single phase AC circuits; Alternating quantities - Generation sinusoidal emf.-Mathematical equations - Definitions and explanations of the terms: wave form, cycle, time period, frequency, amplitude, phase, phase difference, rms value, average value, form factor and peak factor - Calculations for square, triangle, trapezoidal and sinusoidal waveforms.

Phasor representation of sinusoidal qualities - Phase difference - Addition and subtraction of sinusoids -Symbolic representation - Cartesian, polar and exponential forms.

Analysis of ac circuits: R, L, C, RL, RC and RLC circuits using phasor concept -Concept of impedance, admittance, conductance and susceptance - Power in single phase circuits - Instantaneous power - Average power - Active and reactive powers - Apparent power - Power factor - Complex power - Solutions of series, parallel and series-parallel AC circuits. - Series and parallel resonances - Q-factor - Frequency response curves - Half power frequencies - Bandwidth -Application of Thevenin's and Norton's theorems for AC circuits.

Module IV (10 hours)

Analysis of polyphase circuits - 2 phase circuits - Three phase AC circuits -Generation of 3 phase AC voltages"- Balanced system - Phase sequence -Star-delta transformation - Balanced 3 phase AC source supplying balanced 3 phase star connected and delta connected loads - 3 wire and 4 wire systems -Neutral current - Active power, reactive power, apparent power, and power factor - Power factor.

Improvement-Unbalanced systems - Neutral shift (explanation and concept only) - Three phase power measurement - Three wattmeter and Two wattmeter methods.

Text Books

1. Hughes E. Electrical technology, Pearson Education.
2. D.P. Kothari & Nagarth - Theory and problems of Basic Electrical Engineering - Prentice Hall (India) PVT LTD.

Reference books

1. Edminister J A. Electric circuits, Schaum's series. McGraw Hill.
2. Van valkenberg, Electric circuits and network analysis, Prentice Hall (India) PVT LTPT
3. Smarjith Ghosh - Fundamentals of Electrical and Electronics Engineering Prentice Hall (India) PVT LTD.

Internal work assessment

60 % -Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50.

University examination pattern

QI - 8 short type questions of 5 marks 2 from each module.
QII- 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
QIV- 2 questions A and B of l5 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

EC04 - 110(P)) MECHANICAL WORKSHOP

(Common for EC, IC, AI, BM, BT)

3 hours practical per week

1. **Machine Shop Practice**
   - Study of different machine tools-lathe-shaper-milling machine- drilling machine-grinding machine
   - Exercises on lathe-models involving straight turning, taper turning, facing, knurling, boring, and thread machining-thread standards and specifications.

2. **Fitting Practice**
   - Study of hand tools and measuring tools used in fitting work
   - Fabrication exercises involving cutting, chiseling, filing, and drilling - use of thread dies and taps.

3. **Welding Practice**
   - Study of welding equipment and tools-safety practices.
   - Demonstration of electric arc welding, gas welding and cutting
   - Exercises involving preparation of different types of welded joints-lap and butt joints.
   - Demonstration of special welding processes-welding defects and weldment inspection

4. **Sheet metal work**
   - Study of tools and equipment for sheet metal work.
   - Types of joints in sheet metal work-cutting, bending, forming, and joining operations-development & fabrication of simple sheet metal components like tray, funnel, cylindrical dish, rectangular duct, etc.
   - Demonstration of brazing, soldering, shearing/cutting machine.

Internal work assessment

Workshop practicals and		= 30
2 tests	2x10	= 20
Total marks		= 50

EC04 - 111(P): ELECTRICAL AND ELECTRONICS WORKSHOP

(Common for EE,EC, AI, IC,BT, BM, CS, IT, PT)

2 hours practicals per week

Part A: Electrical Workshop (2 hours per alternate weeks)

1. Familiarisation of various types of Service mains - Wiring installations - Accessories and house-hold electrical appliances
2. Methods of earthing - Measurement of earth resistance - Testing of electrical installations - Precautions against and cure from electric shock
3. Practice of making Britannia joints on copper / aluminium bare conductors.
4. Practice of making Married joints on copper / aluminium conductors.
5. Practice of making T joints on copper / aluminium conductors
6. Wiring practice of a circuit to control 2 lamps by 2 SPST switches.
7. Wiring practice of a circuit to control 1 lamp by 2 SPDT switches.
8. Wiring practice of a circuit to control 1 fluorescent lamp and 1 three-pin plug socket.
9. Wiring practice of a main switch board consisting of ICDP switch, DB, MCB's, and ELCB's.
10. Familiarisation of various parts and assembling of electrical motors and Wiring practice of connecting a 3-phase / 1-phase motor with starter

Internal work assessment

Workshop practicals and record	=	15
Test/s	=	10
Total marks	=	25

Part B - Electronics Workshop (2 hours per alternate weeks)

1. Familiarisation of various electronics components such as resistors, AF&RF chokes, capacitors, transistors, diodes, IC's and transformers.
2. Assembling and soldering practice of single phase full wave bridge rectifiers circuit with capacitor filter.
3. Assembling and soldering practice of common emitter amplifier circuit.
4. Assembling and soldering practice of common emitter amplifier circuit on PCB.
5. Assembling and soldering practice of non inverter amplifier circuit using OPAMP on PCB.
6. Assembling of a timer circuit IC555, phase shift oscillator circuit using OPAMP and JK flip-flop using NAND gates on a bread-board.
7. Coil winding - Single layer and multi layer - Demonstration.
8. Miniature transformer winding – Demonstration.
9. PCB layout using software like ORCARD, CIRCUITMAKER, EDWIN.
10. PCB fabrication – Demonstration.

Internal work assessment

Workshop practicals and record	=	15
Test/s	=	10
Total marks	=	25

THIRD SEMESTER

EN04 - 301A: ENGINEERING MATHEMATICS

(Common for all B.Tech. programme except CS and IT)

3 hours lecture and 1 hour tutorial per week

Module I

Linear Algebra: Vector spaces- linear dependence and impedance, and their computation- Bases and dimension- Subspaces- Inner product spaces- Gram-Schmidt orthogonalization process- Linear transformations- Elementary properties of linear trans formations- Matrix of a linear transformation. (Proofs of theorems omitted)

Module II

Fourier Transforms: Fourier integral theorem (proof not required)- Fourier sine and cosine integral representations- Fourier transforms- Fourier sine and cosine transforms- Properties of Fourier transforms- Singularity functions and their Fourier transforms.

Module III

Probability Distributions: Random variables- Mean and variance of probability distributions- Binominal and Poisson distributions- Poisson approximation to binominal distribution- Hypergeometric and geometric distributions- Probability densities- Normal, uniform and gamma distributions.

Module IV

Theory of lnference: Population and samples- Sampling distributions of mean and variance- Point and interval estimations- Confidence intervals for mean and variance- Tests of hypotheses- Hypotheses concerning one mean, two mean, one variance and two variances- Test of goodness of fit.

TEXTBOOKS

For Module I

K. B. Datta, Matrix *and Linear Algebra for Engineers,* **Prentice-Hall of India,** New Delhi, 2003
(Sections: 5.1, 5.2, 5.3, 5.4, 5.5, 5.8, 6.1, 6.2, 6.3)

For Module II

C R Wylie & L C Barrett, *Advanced Engineering* ***Mathematics*** *(Sixth Edition),* McGraw Hill.
(Sections:9.1,9.3,9.5)

For Module III

Richard A Johnson, *Miller & Freund's Probability and Statistics for Engineers,* Pearson Education, 2000. (Sections: 4.1,4.2,4.3,4.4,4.6,4.8, **5.1,**5.2,5.5,5.7)

For Module IV

Richard A Johnson, *Miller & Freund's Probability and Statistics for Engineers,* Pearson Education, 2000. (Sections: 6.1,6.2,6.3,7.1,7.2,7.4,7.5,7.8,8.1,8.2,8.3,9.5)

REFERENCES

1. Bernard Kolman & David R Hill, *Introductory Linear Algebra with Applications (Seventh Edition),* Pearson Education, 2003.
2. Lipschutz S, *Linear Algebra - Schaum's Outline Series,* McGraw Hill
3. Erwin Kieyszig, *Advanced Engineering Mathematics (Eighth Edition),* John Wiley & Sons.
4. Larry C Andrews & Bhimsen K Shivamoggi, *Integral Transforms forEngineers,* Prentice-Hall of India, 2003.
5. Ronald E Walpole, et al, *Probability and Statistics for Engineers and Scientists (Seventh Edition),* Pearson Education, 2004
6. Robert V Hogg & Elliot A Tanis, *Probability and Statistical Inference,* Pearson Education, 2003.
7. Chatfield C, *Statistics for Technology, Chapman & Hall*

Internal work assessment

60 % - Test papers (minimum 2)
30 % -Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

Q1 - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 marks from module I with choice to answer any one
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one

EC04 – 302: COMPUTER PROGRAMMING IN C

(Common for all B. Tech. programmes except CS, IT& PT)

2 hours lecture and 2 hours practical per week

Module I (12 Hours)

Programming and problem solving- Basic computer organization- Developing algorithms- Flow charts- High level and low level languages- Compilers and interpreters- Steps involved in computer programming- Writing, compiling and executing a program- Debugging a program- Description of a programming language.

Module II (18 Hours)

Basics of C- Overview of C- Program structure- Lexical elements- Numerical constants- Variables- Arithmetic operators- Arithmetic Expressions- Arithmetic conversion- Increment and Decrement operators- Assignment expressions-Multiple assignments- Input and output- Format specifiers - Fundamental data types- Bit level operators and applications- Relational operators- Relational expressions- Logical operators- Logical expressions- Conditional operator- Precedence and associativity of operators.

Module III (16 Hours)

Compound statements- Conditional statements- if statement- if else statement-nested statement- switch statement- Loop control statements- While statement-do while statement- for statement- continue statement- break statement- go to statement- Functions- user defined functions- library functions- Recursion- Global, local and static variables.

Module lV (20 Hours)

Arrays- single dimensional- multi dimensional- Arrays in functions- Stacks-Strings- String processing- Bit-wise operators- Enumerated data types- Structures - Type def - Structures in Arrays- Arrays in structures- Unions- Pointers-Pointers and Arrays- Pointers and functions- Linear linked lists and list operations- Files- sequential files- unformatted files- text files.

Text books

Rajaraman V., Computer Programming in C, Prentice Hall of India

Reference Books:

1. Kernighan B. W., & Ritchie, D.M., The C Programming Language, Prentice Hall of India.
2. Balaguruswamy, Programming in ANSI C, Tata McGraw Hill
3. Venugopal K.R & Prasad S.R., Programming with C, Tata McGraw Hill

Internal work assessment

60 % - Test papers (minimum 2)
30 % - Assignments/Term project/any other mode decided by the teacher.
10 % - Other measures like Regularity and Participation in Class.
Total marks = 50

University examination pattern

QI - 8 short type questions of 5 marks, from each module
QII - 2 questions A and B of I5 marks from module l with choice to answer any one
QIII- 2 questions A and B of 15 marks from modules II with choice to answer any one
Q IV- 2 questions A and B of 15 marks from module III with choice to answer any one.
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 – 303: ELECTRIC CIRCUIT & NETWORK THEORY

(Common withAI04 303)

3 hours lecture and 1 hours tutorial per week

Objectives:

- To expose the students to basic concepts of electric circuits and methods of circuit analysis in time domain and frequency domain
- To introduce the fundamentals of filter circuits

Module I (14 hours)

Review of Network theorems. Signal representation - Impulse, step, pulse and ramp functions. Laplace Trans form-properties-solution of differential equation (review). Circuit analysis applications of Laplace

Transform-Notions of impedance and admittance-Nodal and loop analysis in the s-domain. Use of Laplace Transform in the transient analysis of RC and LC networks with impulse, step, exponential, pulse and sinusoidal inputs. Initial and final value theorems, step input for RLC circuits.

Module II (12 hours)

Network functions - The concept of complex frequency - driving point and transfer functions - Impulse response - Poles and Zeros of network functions, their locations and effects on the time and frequency

domain responses. Restriction of poles and zeros in the driving point and transfer function. Time domain behaviour from the pole - zero plot. Frequency response plots -Bode plot.

Module III (13 hours)

Parameters of two-port network - impedance, admittance, transmission and hybrid - Conversion formulae. Attenuators - propagation constant, types of attenuators - T, 6 and Bridged T. Analysis of interconnected two port networks-parallel, series, and cascade connections of 2 port networks -simple problems. Characteristic impedance and propagation constant.

Module IV (13 hours)

Filters- Introduction and basic terminology - types of filtering- L.P filter basics-Butterworth LP filter transfer characteristics- Basic passive realization of Butterworth transfer functions. Frequency transformations- transformations to high pass, band pass and band elimination. Chebyshev filters-characteristics-poles of the Chebyshev function.

Text Books

1. R. A. DeCarlo and P. Lin, *Linear Circuit Analysis*, Oxford University Press, New Delhi, 2001
2. D. R. Choudhary, *Networks and Systems,* New Age International, New Delhi, 2000

Reference Books

1. W. H. Hayt Jr, J. E. Kemmerly, and S. M. Durbin, *Engineering Circuit Analysis*, Tata McGraw-Hill, New Delhi, 2002
2. W. K. Chen, *Passive and Active Filters-Theory and Implementations*, John Wiley & Sons, New York, 1986
3. J. Edminister and M. Nahri, *Electric Circuits,* 3rd ed., Tata McGraw Hill, New Delhi, 1999.
4. M. E. Vanvalkenburg, *Network Analysis*, 3rd ed., Prentice Hall of India, New Delhi, 2001

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
(One assignment shall be based on simulation of simple electric circuits using any software -eg. PSPICE, EDSPICE, MULTSIM)
10% - Other measures like regularity and participation in class
Total marks: 50.

University examination pattern

QI - 8 short type questions of 5 marks, from each module
QII - 2 questions A and B of I5 marks from module l with choice to answer any one
QIII- 2 questions A and B of 15 marks from modules II with choice to answer any one
Q IV- 2 questions A and B of 15 marks from module III with choice to answer any one.
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 – 304: ECTRICAL ENGINEERING

(Common with A I04 304)

3 hours lecture and 1 hour tutorial per week

Module I: DC machines (10 hours)

Types of DC machines - DC generators - emf equation - Open circuit and load characteristics of different types of DC generators - DC motors - Principle of operation - Types - Torque equation - Characteristics -Starters

Module II: Transformers (10 hours)

Principle of operation - emf equation - Phasor diagram - Equivalent circuit - OC and SC tests - Basic principles of auto transformer and three phase transformer

Module III: AC machines (17 hours)

Alternator - Rotating field - Frequency effect of distribution of winding - emf equation - Basic principles of synchronous motor - Losses and Efficiency -Torque equation - Starting methods - Induction motor -Constructional features - Principle of operation of 3 phase induction motor - Vector diagram and equivalent circuits - Starting and speed control of squirrel cage and wound rotor induction motor

Module IV: Electrical measurements (15 hours)

Principle of Indicating instruments- moving coil, moving iron and dynamometer type instruments - Extension of range of voltmeter and ammeter - Measurement of 3 phase power by two wattmeter method -Principle and working of Induction type energy meter- DC slidewire, potentiometer - Wheat stone bridge - Kelvin's double bridge - AC bridges - Schering bridge, Maxwell's bridge

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50

Text Book

E. Hughes, *Electrical & Electronic Technology,* 8th ed., Pearson Education, Delhi, 2002.

Reference Books

1. H. Cotton, *Advanced Electrical Technology,* Sir Isaac Pitman and Sons, London, 1974
2. E. W. Golding and F. G. Widdis, *Electrical Measurements and Measuring Instruments,* 5th ed., A H Wheeler & Company, Calcutta, 1993

University examination pattern

QI - 8 short type questions of 5 marks, from each module
QII - 2 questions A and B of I5 marks from module l with choice to answer any one
QIII- 2 questions A and B of 15 marks from modules II with choice to answer any one
Q IV- 2 questions A and B of 15 marks from module III with choice to answer any one.
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

EC04 – 305: ELECTRONIC CIRCUITS-I

3 hours lecture and 1 hour tutorial per week

Module 1(13 Hours)
The transistor as an amplifier—Derivation of expression for small signal parameters—the transconductance input resistance—small signal emitter resistance-Small signal equivalent models—the hybrid model and T Model of transistor. Analysis of common emitter amplifier—CE amplifier with emitter resistance— the resistance reflection rule—Analysis of the common base and Common collector amplifiers—complete static characteristics—internal capacitances—the high frequency hybrid pi model—the cut off frequencies, unity gain bandwidth.

Module 2 (13 Hours**)**
JFET biasing - FET amplifiers - MOSFET Amplifier—The enhancement and depletion MOSFETs—static characteristics—DC analysis—Amplifier using MOSFET—Biasing in discrete circuits and biasing in IC—Small signal equivalent circuit models'—analysis of common source and common gate amplifiers

Module 3 (13 Hours)
The amplifier gain function —Low frequency and high frequency responses— Use of open circuit and-short circuit time constants in finding the cut-off frequencies—Low and high frequency response of common emitter amplifier, common source amplifier- Emitter and source followers.

Module 4 (13 Hours)
Feedback amplifiers—the general feedback structure—effects of negative feedback—Analysis of negative feedback amplifiers—Stability—Study of stability using Bode Plots.
Oscillators- RC phase shift, Wein Bridge, LC and Crystal Oscillators - analysis - UJT Characteristics and relaxation Oscillator

Internal work assessment
60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50

Textbooks:
1.Millman & Halkias: *Integrated Electronics,* McGraw Hill
2.Sedra and Smith: *Microelectronic Circuits,* Oxford University Press

References:
1. Horenstein M N: *Microelctronic Circuits & Devices,* PHI
2. Spencer & Ghausi: *Introduction to Electronic Circuit Design,* Pearson
3. Sudhaker Samuel & Mahadevaswamy, *Electronic Circuits,* Sanguine Technical Publishers

University Examination Pattern
QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 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
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 – 306: SOLID STATE DEVICES

3 hours lecture and 1 hour tutorial per week

Module 1 (13 Hours**)**

Conductivity property of solids-energy bands - semiconductors-direct and indirect semiconductors - charge carriers in semiconductors-effective mass - Carrier oncentrations-Fermi level-temperature dependence of carrier concentration-drift of carriers – mobility-excess carrier generation-Conductivity due to diffusion of excess carriers-carrier lifetime - diffusion process - continuity equation-steady state carrier injection-diffusion length - Quasi Fermi level

Module 2 (13 Hours)

PN -Junctions-contact potential-equilibrium Fermi levels-space charge at a junction-Expression for Current flow through a junction -reverse bias current-break down mechanisms of the junction in reverse bias-rectifiers, Zener diode-Transient and ac conditions-time variation of stored charge, Switching diodes, capacitance of PN junction, The Varactor diodes-Effects of contact potential on carrier injection, graded junctions- Metal semiconductor junctions- Hetero junctions.

Module 3 (13 Hours)

Bipolar junction transistors-Minority carrier distribution and terminal currents- the coupled diode model-charge control analysis-switching -Drift in the base region, Base narrowing, Avalanche breakdown,

Kirk effect-frequency limitations of transistor-capacitance and charging times-Hetero junction bipolar transistors.

Field effect transistors-various types of FETs-Junction FET, MESFET, Metal Insulator Semiconductor FET, MOSFET - Models, Characteristics and physical effects.

Module 4 (13 **Hours)**

Optoelectronic devices-Photo diodes-light emitting diodes-Semiconductor lasers-Power devices-PNPN diode-The Semiconductor Controlled Rectifier- Insulated Gate Bipolar Transistor-UJT-physical structure, characteristics and applications of each of the above devices.

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks : 50

Text Books:

1. Ben G Streetman and Sanjay Banerjee: *Solid State Electronic Devices,(Fifth* Edition) Pearson/PHI

References:

1. Sze S M: *Physics of Semiconductor Devices,* Wiley eastern
2. Millman & Halkias: *Integrated Electronics,* McGraw Hill
3. Dilip K Roy: *Physics of Semiconductor Devices,* Universities Press
4. Dipankar Nagchoudhuri: *Microelectronic Devices,* Pearson
5. V.Suresh Babu: *Solid State Devices and Technology,* Sanguine Technical Publishers.

University Examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 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
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 - 307(F): BASIC ELECTRONICS LAB

3 hours practical per week

1.Measurements using CRO
2.Diode and Zener diode characteristics -DC and dynamic resistance
3.First order LPF/HPF with R & C for a given cut off frequency
4.Clipping and clamping circuits with diodes
5.Half wave rectifier with C, LC filters
6.Full wave rectifiers with C, LC filters
7.CE configuration determination of h-parameters
8.CB configuration determination of h-parameters
9.MOSFET/JFET characteristics Common Source and Common Drain modes
10. Series Voltage Regulator

Internal work assessment

50%-Laboratory practical and record
40%- Test/s
I0%- Other measures like regularity and participation in class
Total marks: 50.

EC04 - 308(P): ELECTRICAL ENGINEERING LAB

3 hours practical per week

1. Plot open circuit characteristics of DC shunt generator for rated speed - Predetermine O.C.C. for other speeds - Determine critical field resistance for different speeds.
2. Load test on DC shunt generator - Plot external characteristics - Deduce internal characteristics
3. Load test on DC series motor - Plot the performance characteristics
4. OC and SC tests on single phase transformer - Determine equivalent circuit parameters - Predetermine efficiency and regulation at various loads and different power factors - verify for unity power factor with a load test.
5. Load test on 3 phase cage induction motor - Plot performance curves.
6. Resistance measurement using a) Wheatstone's bridge b) Kelvin's double bridge
7. Measurement of self inductance, mutual inductance and coupling coefficient of

   a) Transformer windings b) air cored coil

8 Power measurement in 3 phase circuit - Two wattmeter method

9. Extension of ranges of ammeter and voltmeter using shunt and series resistances
10. Calibration of Single phase energy meter by direct loading

Internal work assessment

50% -Laboratory practical and record
40% - Test/s
10% - Other measures like regularity and participation in class
Total marks: 50

FOURTH SEMESTER

EN04 401A ENGINEERING MATHEMATICS - IV

(Common for all B. Tech. programmes except CS and IT)

3 hours lecture and 1 hour tutorial per/week

Module I

Functions of a Complex Variable I: Functions of a complex variable- Derivatives and analytic functions- Cauchy-Reimann equations- Laplace equation- Conformal mapping- Exponential functions- Trigonometric functions- Hyperbolic functions- Logarithm- Linear functional transformations.

Module II

Functions of a Complex Variable II: Line integral in the complex plane- Cauchy's integral theorem (Proof of existence of indefinite integral to be omitted)- Cauchy's integral formula- Derivatives of analytical functions (proof to be omitted)- Taylor series- Laurent series- Singularities and zeros- Residues and residue theorem- evaluation of real integrals.

Module III

Series Solutions of Differential Equations:

(i) Power series method for solving ordinary differential equations- Legendre's equation and Legendre polynomials- Rodrigue's formula- Generating functions-Relations between Legendre polynomials- Orthogonality property of Legendre polynomials(proof omitted).

(ii) Frobenius method for solving ordinary differential equations- Bessel's equation- Bessel functions-Generating functions- Relations between Bessel functions- Orthogonality properties of Bessel functions (proof omitted).

Module IV

Partial Differential Equations: Basic concepts- Classification of linear PDE's-Derivation of the one dimensional wave equation and the one dimensional heat equation- Solutions of these equations by the method of separation of vari-ables- Solutions satisfying initial and boundary conditions- D'Alembert's solution of the one dimensional wave equation- Steady state two dimensional heat flow.

Text Book:

Ervin Kreyszig, Advanced Engineering mathematics (8th Edition) John Wiley & Sons

Module I

Sections: 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9

Module II

Sections: **13.1,** 13.2, 13.3,14.4,15.1,15.2,15.3,15.4

Module III

Sections: 4.1, 4.3, 4.4, 4.5

Module IV

Sections: 11.1, 11.2, 11.3, 11.4, 11.5

REFERENCES

1. C R Wylie & L C Barrett, *Advanced Engineering Mathematics (Sixth Edition),* McGraw Hill.
2. Churchill R V, Brown J W & Verhey R F, *Complex Variables and Applications,* McGraw Hill.
3. Pipes LA & Harvill L R, *Applied Mathematics for Engineers & Physicists,* McGraw Hill.
4. Michael D Greenberg, *Advanced Engineering Mathematics (Second Edition)* Pearson education Asia.
5. Sastry S S, *Engineering Mathematics - Volumes 1 & 2,* Prentice Hall of India.

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50.

University Examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 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
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EN04 – 402: ENVIRONMENTAL STUDIES

3 hours lecture and 1 hour tutorial per week

Objective:

The importance of environmental science and environmental studies cannot be disputed. Continuing problems of pollution, loss of forest, solid waste disposal, degradation of environment, loss of bio diversity etc. have made everyone aware of environmental issues. The objective of this course is to create general awareness among the students regarding these environmental issues

Module 1 (12 Hours)

The multidisciplinary nature of environmental studies

Definition- Scope and importance- need for public awareness.

Natural Resources

Renewable and non renewable resources:

Natural resources and associated problems- forest resources: use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their defects on forests and tribal people- water resources: Use and over utilization of ground and surface water, floods, drought, conflicts over water, dam benefits and problems- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies - Food resources: world food problems, changes caused by agriculture overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non renew-able energy sources, use of alternate energy sources, case studies - Land resources: Land as a resource, Land degradation, man induced land slides, soil erosion and desertification- role of an individual in conservation of natural resources- Equitable use of resources for sustainable life style.

Module 2 (12 Hours)

Ecosystem: Concept of an ecosystem- Structure and function of an ecosystem-producers, consumers and decomposers- Energy flow in the ecosystem- ecological succession- Food Chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystems: Forest ecosystem- grassland ecosystem - desert ecosystem -aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) **Bio diversity and its conservation** Introduction-definition: genetic, species and ecosystem diversity- bio geographical classification of India- value of bio diver-sity: consumptive use, productive use, social, ethical, aesthetic, and option values - Bio diversity at global, national, and local levels - India as a mega diversity nation - hot spots of Bio diversity- threads to bio diversity: habitat loss, poaching of wild life man- wildlife conflicts- endangered and endemic species of India - conservation of bio diversity : in-situ and ex-situ conservation of bio diversity

Module 3 (11 Hours)

Environmental pollution Definition-causes, effects and control measures of :-air pollution-water pollution- soil pollution- marine pollution- noise pollution-thermal pollution- nuclear hazards- solid waste

management: causes, effects and control measures of urban and industrial wastes-role of an individual in prevention of pollution- pollution case studies - Disaster management: Floods, earth quake, Cyclone and Land slides- environmental protection act- air (prevention and control of pollution) act - water (prevention and control of pollution) act - wild life protection act- forest conservation act -issues involved in enforcement of environmental legislation- public awareness.

Module 4 (10 Hours)

Social Issues and the environment

From unsustainable to sustainable development- urban problems related to energy- water conservation, rain water harvesting, water shed management- resettlement and rehabilitation of people; its problems and concerns, case studies- Environmental ethics: Issues and possible solutions- climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies- waste land reclamation- consumerism and waste products.

Human population and the environment

Population growth, variation among nations- population explosion- Family welfare programme- Environment and human health- pollution hazards, sanitation and health- Human rights for clean environment- Value education- HIV/AIDS-social concern- Women and child welfare- Role of information technology in environment and human health- case studies.

Field work (5 Hours)

- Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain
- Visit to local polluted site- urban/rural/industrial/agriculture
- Study of common plants/insects/birds
- Study of simple eco systems- pond, river, hill slopes etc.

Text books

1. Clark, R.S. Marine Pollution. Clanderson Press Oxford
2. Mhaskar A.K, Matter Hazardous. Techno-science Publications
3, Miller, T.G Jr. Environmental Science. Wadsworth Publishing Co.
4, Townsend, C, Harper, J. and Michael Begon, Essential of Ecology, Blackwell Science
5, Trivedi. R.K. and Goel. P.K. Introduction to air pollution. Techno - Science Publications

Reference Books

1. Agarval. K.C.2001 Environmental biology. Nidi Publ. Ltd. Bikaner
2. Bharucha Erach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad-380 013, India, Email: mapin@icenet.net
3. Brunner, R.C. 1989. Hazardous Waste Incineration. McGraw Hill Inc. 480p
4. Cunningham, W.P., Cooper, T.H., Gorhani, E & Hepworth, M.T. 2001 Environmental encyclopedia Jaico publ. House Mumbai 1196p
5. De, A.K. Environmental Chemistry. Wiley Eastern Ltd.
6. Down to Earth, Centre for Science and Environment
7. Gleick, H.P. 1993. Water in crisis. Pacific Institute for Studies in Dev., Environment and security, Stockholm Env. Institute. Oxford Univ. Press. 473p
8. Hawkins, R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay
9. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment Cambridge Univ. Press 1140p.
10. Jadhav, H. & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi
11. Mckinney, M.L. & School, R.M. 1996. Environmental Science system & Solutions, Web enhanced edition, 639p.
12. Odum, E.P. 1971. Fundamentals of Ecology. W.B.Saunders Co. USA, 574p
13. Rao, M.N. & Datta, A.K 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p.

14.Sharma, B.K. 2001. Environmental Chemistry. Goel Publ. House, Meerut.
15.Survey of the Environment, The Hindu (M)
16.Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II. Enviro Media
17.Wagner. K. D. 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p Magazine

Internal assessment:

2 Tests	= 20
Field work and Report (Internal Assessment)	= 25
Regularity	= 05
Total marks	= 50

University Examination Pattern:

QI - 16 short answer questions(4 from each module) of 5 marks each with choice to answer any 12(12x5)
QII - 2 questions A and B of 10 marks from module I with choice to answer anyone
QIII- 2 questions A and B of 15 marks from module III with choice to answer any one
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 – 403: DIGITAL ELECTRONICS

3 hours lecture and 1 hour tutorial per week

Objective:
To provide a basic idea in Digital principles, combinational circuits, sequential circuits and design of the above circuits.

Module 1 (13 Hours)
Logic Circuits-truth tables -Boolean algebra-synthesis in standard forms- design examples-optimized implementation of logic functions- Minimisation techniques (Karnaugh map & Queen Mclusky methods)-Multi level synthesis and analysis -cubical representation and minimization-Number representation and arithmetic circuits-Signed and unsigned adder subtracters-fast adders -fixed point- floating point-and BCD representations-ASCII character code.

Module 2 (13 Hours)
Introduction to logic families and their characteristics (TTL,ECL,CMOS) - Interfacing - Combinational circuit building blocks-multiplexers-decoders-encoders-code converters-Flip flops-SR, D, T, JKM/S & edge triggered flip flops-registers-counters-reset synchronization-BCD, ring, Johnson counters.

Module 3 (13 Hours)
Synchronous sequential circuits-Mealy & More state models-Design Examples-State minimization-Design of counters using sequential circuit approach-Finite State Machine (FSM) as an arbiter circuit-Analysis of synchronous sequential circuit-Algorithmic state machine charts-Formal models.

Module 4 (13 Hours)
Asynchronous sequential circuits-Analysis and synthesis-state reduction-transition diagram-Exploiting unspecified next state entries-state assignment using additional state variables-one hot sate assignment – Hazards-Static hazards-Dynamic hazards-Significance of Hazards

Internal work assessment
60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50

Text Book:
1. Taub and Schilling *Digital Principles and applications*
2. N N Biswas *Logic design Theory* PHI

References:

1. John F Wakerly, *Digital Design- Principles and Practices(Third* edition), Pearson
2. Mano M M, *Digital Design,* PHI
3. John M. Yarbrough, *Digital Logic - Applications and Design,* Thomson/Vikas Publishing House
4. Thomas L Floyd, *Digital Fundamentals* (Eight edition), Pearson
5. Roth C H, *Fundamentals of Logic design,* Jaico
6. Salivahanan.S , *Digital Circuits and Design,* Vikas Publishing House

University Examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII -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.
QIV - 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 – 404: COMPUTER ORGANIZATION AND ARCHITECTURE

3 hours lecture and 1 hour tutorial per week

Module 1

Design methodology - the register level components, devices and design-the processor level components and design - Processor basics - CPU Organization - Data Representation - Instruction set - Instruction formats-types and programming considerations.

Module 2

Data path design - fixed point arithmetic - various operations - arithmetic & logic units - combinational and sequential ALUs. Floating point arithmetic - pipeline processing -Control design - Hardwired control - micro programmed control.

Module 3

Memory Organization - memory technology - Device characteristics - Random access memories - serial access memories - Memory systems - multi level memories - Address translation memory allocation - caches - features - address mappings - Structures versus performance.

Module 4

System organization - communication methods - basic concepts, bus control - I/O and system control - Programmed I/O - DMA and interrupts; I/O processors- Parallel processing - Processor level parallelism-multiprocessors-shared bus systems.

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50

Text Book:

1. John P Hayes: *Computer Architecture and Organization* (3rd Edition) Mc Graw-Hill

References:

1. William Staliings: *Computer Organization & Architecture* (6th Edition) Pearson
2. M Morris Mano; *Computer System Architecture*,(3rd Edition), PHI/Pearson
3. Heuring & Jordan: *Computer Systems Design & Architecture,* Addison Wesley
4. Patterson D A & Hennessy J L: *Computer Organization & Design,* Morgan Kaufman

University Examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module I with choice answer any one.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV - 2 questions A and B of l5 marks from module III with choice to answer any one.
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 - 405 : ELECTRONIC CIRCUITS - II

3 hours lecture and 1 hour tutorial per week

Module 1(13 Hours)

Differential Amplifiers - The BJT differential pair - Large and small signal operation - The MOS differential pair - Large and small signal operation - Non ideal characteristics of the differential amplifier - Differential amplifier with active load - Frequency response analysis. Two stage CMOS Op-Amp - circuit, Common mode range and output swing, voltage gain, frequency response, slew rate.

Module 2 (13 Hours)

RC differentiator and integrator circuits - Compensated attenuators - Pulse transformer - Blocking oscillator - Bistable multivibrator principles, analysis -fixed bias and self biased transistor bistable circuit - triggering methods - Schmitt trigger analysis of emitter coupled circuit.

Module 3 (13 Hours)

Monostable multivibrator - principle and analysis - collector coupled and emitter coupled versions - triggering - astable multivibrators - collector coupled and emitter coupled circuits - analysis - sweep circuits - principles of miller and bootstrap circuits

Module 4 (13 Hours)

Power amplifiers - Class A, B, AB, C, D & S power amplifiers - Harmonic distortion - Efficiency - Wide band amplifiers - Broad banding techniques - Low frequency and high frequency compensation - Cascode amplifier - Broadbanding using inductive loads

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50

Text books

1. Millman & Halkias, *Integrated Electronics,* McGraw Hill
2. Millman J. & Taub H., Pulse, Digital & Switching Waveforms, Tata McGraw Hill
3. Sedra A.S.& Smith K.C., *Microelectronic Circuits,* Oxford University Press

Reference books

1. Taub & Schilling, *Digital Integrated Electronics,* McGraw Hill
2. Hayt W.H., Electronic Circuit Analysis & Design, Jaico Pub.
3. BogartT.F., Electronic Devices & Circuits', McGraw Hill.

University Examination Pattern

QI - 8 short type questions of 5 marks, 2 from module
QII - 2 questions A and B of l5 marks from module I with choice to answer any one
QIII - 2 questions A and B of 15 marks from module III with choice to answer any one
QIV - 2 questions A and B of 15 marks from module IV with choice to answer any one
QV - 2 questions A and B of 15 marks from module V with choice to answer any one

EC04 – 406 : ANALOG COMMUNICATIONS

3 hours lecture and 1 hour tutorial per week

Module-1

Linear continuous wave modulation - band pass signals and systems - Amplitude modulation - modulators and transmitters - SSB signals, spectra and generation - VSB - signal and spectra - frequency conversion and demodulation. Exponential continuous- wave modulation - FM & PM - narrow band case, tone modulation, multi tone periodic modulation. Transmission band width and distortion - various cases - Generation and detection of FM and PM - various approaches - interference, de-emphasis and pre-emphasis, capture effect.

Module -2

Receivers for continuous wave modulation - super-het direct conversion and special purpose receivers, receiver specifications, multiplexing systems - frequency division, Quadrate carrier and time division multiplexing - cross talk and guard time comparison of TDM and FDM.
Phase locked loop operation, synchronous detection and frequency synthesis FM detection, Television systems - video signals, resolution and band width -Monochrome transmitters and receivers, basic principles of color TV and HDTV.

Module-3

Review of probability models - Random signals and noise - Ensemble average| and correlation, Ergodic and stationary processes, Gaussian processes - power spectrum, super position and modulation, filtered random signals - noise - thermal noise white noise, noise equivalent band width - base band signal transmission with noise - pulse measurements in noise

Module-4

Noise in analog modulation systems - band pass noise - system models, quadrature components, envelope and phase - linear continuous wave modulation with noise - synchronous detection, envelope detection and threshold effect Exponential continuous wave modulation with noise - pos detection noise destination S/N, FM threshold effect - comparison of continuous wave modulation systems.

Sampling and reconstruction - pulse amplitude modulation, pulse time modulation-ideal ampling, practical sampling and aliasing.

Internal work assessment

60% - Tests (minimum 2)
30% - Assignments/term project/any other mode decided by the teacher
10% - Other measures like regularity and participation in class
Total marks: 50

Text book:

1. Bruce Carlson: Communication Systems, (Fifth Edition), McGraw Hill

References.

1. Simon Haykin, "*Communication Systems"*, John Wiley
2. Ziemer R.E. & Tranter W.H., *"Principles of Communication"*, JAICOP Publishing House
3. Dennis Roddy, John Coolen, *"Electronic Communications"*, PHI
4. Sam Shanmugam K., *"Digital and Analog Communication Systems"*, John Wiley
5. Lathi B.P., *"Modern Digital and Analog Communication Systems"*, Oxford University Press.
6. Tomasi, *Electronic Communication: Fundamentals Through Advanced*, Pearson Education

University Examination Pattern

QI - 8 short type questions of 5 marks, 2 from module
QII - 2 questions A and B of l5 marks from module I with choice to answer any one
QIII - 2 questions A and B of 15 marks from module III with choice to answer any one
QIV - 2 questions A and B of 15 marks from module IV with choice to answer any one
QV- 2 questions A and B of 15 marks from module V with choice to answer any one

EC04 - 407(P) : ELECTRONIC CIRCUITS LAB

3 hours practical per week

1. Feed back voltage regulator with short circuit protection
2. Voltage regulation with Zener diode and pass transistor.
3. RC coupled amplifier- design for gain - frequency response
4. JFET amplifier - design for gain - frequency response
5. Feedback amplifiers - gain & frequency response
6. Emitter follower with and without complementary transistors frequency response
7. Phase shift oscillator using BJT/FET
8. LC Oscillators
9. Power amplifier
10. Cascode amplifier - frequency response
11. Active load MOS amplifier
12. **UJT** characteristics and relaxation oscillator
13. Narrow band high gain tuned amplifier

Internal work assessment

50%-Laboratory practical and record
40%- Test/s
10%- Other measures like regularity and participation in class
Total marks: 50.

EC04 - 408(P): DIGITAL ELECTRONICS LAB

3 hours practical per week

1. Characteristics of TTL gates
2. Code converters using basic gates
3. Combinational logic design using decoders and MUXs
4. Half and full adders and subtractors
5. Four bit adder, subtracter and BCD adder using adder ICs
6. Implementation of single cell Arithmetic Logic Unit and study of ALU ICs
7. Astable and monosatable multivibrators using CMOS gates
8. Study of flip flops
9. Ripple , Johnson and Ring counters
10. Synchronous counters, Random sequence generators
11. A sequence detector circuit
12. Interfacing and-addressing memory chips
13. ADC circuits (counter ramp and dual slope) & ICs
14. DAC circuits & ICs

Internal work assessment

50%-Laboratory practical and record
40%- Test/s
10%- Other measures like regularity and participation in class
Total marks: 50

FIFTH SEMESTER

EC04 - 501: SIGNALS AND SYSTEMS

(Common with AI 04 501,IC 04 501 and BM04 501)

3 hours lecture and 1 hour tutorial per week

Objectives

- To impart the basic concepts of continuous and discrete signals and systems
- To develop understanding about frequency domain approaches used for analysis of continuous and discrete time signals and systems
- To establish the importance of z-transform and its properties for analysing discrete time signals and systems

Module I (12 hours)

Introduction to signals and systems-classification of signals-basic operations on signals-elementary signals-concept of system-properties of systems-stability, invertibility, time invariance, linearity, causality, memory, time domain description-convolution-impulse response-representation of LTI systems-differential equation and difference equation representation of LTI systems

Module II (15 hours)

Fourier representation of continuous time signals- Fourier trans form-existence of the Fourier integral- FT theorems-energy spectral density and power spectral density-frequency response of LTI systems-correlation theory of deterministic signals-condition for distortionless transmission through an LTI system- transmission of a rectangular pulse through an ideal low pass filter-Hilbert trans form-sampling and reconstruction

Module 111(13 hours)

Fourier representation of discrete time signals- discrete Fourier series and discrete Fourier transform- Laplace Transform analysis of systems-relation between the transfer function and differential equation-causality and stability-inverse system- determining the frequency response from poles and zeroes

Module IV (14 hours)

Z-trans form-definition- properties of the region of convergence- properties of the Z-transform-analysis of LTI systems-relating the transfer function and difference equation-stability and causality-inverse systems-determining the frequency response from poles and zeroes

Text Books

1. S. Haykin and B. V. Veen, *Signals and Systems,* John Wiley & Sons, N. Y.,2002
2. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, *Signals & Systems,* 2nd ed., Prentice Hall of India, New Delhi, 1997

Reference Books

1. C.L.Philips, J.M. Parr, E. A Riskin, *Signals, Systems and Transforms,* 3rd ed., Pearson Education, Delhi, 2002
2. R. E. Zeimer, W. H. Tranter, and D. R. Fannin, *Signals and Systems: Continuous and Discrete*, 4th ed., Pearson Education, Delhi, 1998
3. M. J. Roberts, *Signals and Systems: Analysis using Transform methods and MA TLAB,* Tata McGraw Hill, New Delhi, 2003

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 marks from module I with choice to answer any one.
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 502: MECHANICAL ENGINEERING

3 hours lecture and 1 hour tutorial per week

Objectives:
After studying this paper students should be aware of the basic principles of thermodynamics and areas where it can be applied.

Module I (13 hours)
Thermodynamics - thermodynamics systems - thermodynamic properties and processes - heat and work - equation of state - properties of ideal gases -properties of pure substances Zeroth law of thermodynamics - temperature] scales - first law of thermodynamic - heat, work and energy of closed and open systems - concept of internal energy - enthalpy - second law of thermodynamics - concept of entropy - availability of work and energy

Module II (13 hours)
Engineering applications of thermodynamics - air cycles - Carnot cycle - otto and diesel cycles - principle of operation of 2 stroke and 4 stroke engines, vapour power cycles - Mollier diagram - ranking cycle

Module III (13 hours)
Heat transfer - basic modes of heat transfer - conduction, convection and radiation - conduction - Fourier law of conduction - general conduction equation - convection - forced and free convection - heat transfer relations - radiation - laws of radiation - concepts of black body

Module IV (13 hours)
fluid mechanics - laws of fluid motion, continuity, momentum and energy equations - Bernoulli's equation and its application to flow and velocity measuring devices - capillary flow and viscous flow

Text books
1. Rajendra Prakash & Gupta, *Engineering Thermodynamics*
2. Holman J.P., *Heat Transfer,* McGraw Hill

Reference books
1. Michael saad, *Thermodynamics for Engineers,* Prentice Hall
2. Spalding & Cole, *Engineering Thermodynamics,* Edward Arnold

Internal work assessment
60% - Test Papers (Minimum 2*)*
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII-2 questions A and B of 15 marks from module I with choice to answer any one.
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 503: LINEAR INTEGRATED CIRCUITS

3 hours lecture and 1 hour tutorial per week

Objectives:

To enable the student for designing efficient practical circuits using Op - Amps, timer, PLL, VCO and Voltage regulator chips.

Module-1

Linear Op-Amp circuits - basic configurations - ideal Op-Amp circuit analysis - The 741 Op-Amp circuit, various stages and parameters - DC analysis – small signal analysis - Gain, frequency response and slew rate of the 741- summing and difference amplifiers - Differentiator and integrator - I-V and V-I converters - Instrumentation amplifier - log and antilog amplifiers - analog multipliers - Voltage Comparators - Schmitt trigger - Signal generators - Phase shift and Wien bridge Oscillators - Astable and Monostable Circuits - linear sweep circuits.

Module - 2

Active filters - filter transfer function - Butterworth and Chebyshev filters First otder and second order functions for low-pass high-pass band-pass band- stop and all-pass filters - Sallen - key LPF and HPF - Delyiannis-Friend band pass filters - twin-tee notch filter - Second order LCR Resonator and realizations] of various types - Filters based on inductor replacement - switched capacitor] filters

Module-3

Data converters - definitions and specifications - D/A converters - Weighted resistor and R-2R DAC - Bipolar DAC - A/D converters - Counter, Ramp, tracking, Successive approximation, Integrating type and flash ADCs. Linear voltage regulators - protection mechanisms - LM723 Functional diagram -Design of voltage regulator using 723 - Three terminal Voltage regulators - functional operation of 78XX series IC and design of fixed and adjustable regulators

Module-4

Phase locked loops - operation of first and second order PLLs - Lock and Capture range - LM565 PLL -Application of PLL as AM/FM/FSK detectors, frequency translator, phase shifter, tracking filter, signal synchronizer and] frequency synthesizer. Voltage controlled oscillator - Functional diagram & operation of IC 566 -Applications of 566 - Timer IC 555 - functional diagram - applications - design of Monostable and Astable multivibrators using 555.

Text Book

1. Sergio Franco - Design with Operational Amplifiers & Analog integrated Circuits
2. Adel S Sedra & Kenneth C Smith Micro Electronic Circuits Fifth Edition
3. Gayekwad

References

1. Gobind Daryanani, *'Principles of Active Network Synthesis & Design'*, John Wiley
2. Sedra A.S. & Smith K.C., *"Microelectronic. Circuits'*, Oxford University Press.
3. CoughlinR.F. & Driscoll F. F., *'Operational Amplifiers and Linear Integrated Circuits'*, Pearson Education.
4. Horenstein M.N., *'Microelectronic Circuits & Devices'*, PHI.
5. K.R Botkar Integrated Circuits.

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 anyone.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one,
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 - 504: ELECTROMAGNETIC FIELD THEORY

3 hours lecture and 1 hour tutorial per week

Objectives:

To make the student introduced with the concepts of field the theory and fundamental equations. This paper is a pre-requisite for the "Radiation and propagation" and "Microwave engineering" in further semesters.

Module 1 (13 hours)

Coordinate systems -Vector fields and theorems— Electrostatics - Coulomb's Law - Gauss' Law - Electric potential, Electric dipole - *Materials and properties in electric field - Energy stored - Boundary conditions - capacitance -parallel plate cylindrical and spherical capacitors - Poisson and Laplace equations -Boundary value problems - Method of Images

Module 2 (13 hours)

Steady electric currents and current density - equation of continuity - Joules law - boundary conditions for current density - Magnetostatics - Biot-Savart Law, Amperes' law - magnetic vector potential, magnetic field intensity - magnetic materials & properties - -boundary conditions for magnetic fields -energy in magnetic fields - forces and torques. Motional electromotive force - Faradays Law of electromagnetic induction

Module 3 (13 hours)

Maxwells' Equations - derivation from basic laws - boundary conditions - time harmonic fields - Poynting theorem - Plane waves propagation - General wave equations - Plane electromagnetic waves Plane waves in free space, dielectric and conducting media - surface resistance - Wave polarization - linear, elliptic and circular - Normal and oblique incidences of uniform plane waves **at** conducting and dielectric boundaries.

Module 4 (13 hours)

Parallel wire transmission line - analysis - input impedance, quarterwave and halfwve lines - standing waves - VS WR - impedance matching - Smith chart-transmission lines- transients in transmission lines - Skin effect and resistance Waveguides - wave equations in Cartesian Coordinates - TM and TE modes -Waveguide Cavity resonators.

Text Book,

1. Guru & Hiziroglu - *Electromagnetic Field Theory*

References.

1. Kraus J.D., *Electromagnetics,* McGraw Hill
2. Mattew N.O., Sadiku, *Elements of Electromagnetics,* Addison Wesley
3. Cheng D.K., *Field and Wave Electromagnetics,* Addison Wesley
4. Hayt W.H., *Engineering Electromagnetics,* McGraw Hill, Kogakusha
5. Premlet B., *Electromagnetic Tlieory with Applications,* Phasor Books

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, *2* from each module.
QII - 2 questions A and B of 15 marks from module l with choice to answer any one.
QIII - 2questions A and B of 15 marks from module II with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 505: ELECTRONIC INSTRUMENTATION

3 hours lecture and I hour tutorial per week

Objectives: To study the basic principle's of "electronic measurements and instrumentation techniques. With this paper, students should be able to come up with techniques for measuring values of passive components and quantities like temperature, pressure, voltage, current, frequency, phase difference, distortion, spectral parameters etc.

Module 1 (13 Hours)
Measurement errors -classification of errors-accuracy, precision, resolution, significant figures-error combinations-basics of statistical analysis- Sensing elements-Potentiometers-resistance thermometers-strain gauges - capacitive sensing elements -electromagnetic sensing elements - thermoelectric sensing elements static and dynamic characteristics of piezo electric sensing elements

Module 2 (13 Hours)
Analog Electronic Volt-Ohm-Milliammeters - Transistor, OPAMP and FET based circuits - multimeter probes-DVMs. Frequency meters-frequency accuracy, time and ratio measurements-counter meters.

Module 3 (13 Hours)
Resistance measurements - various methods, bridges - Inductance and capacitance measurements - ac bridges, digital RLC meters - Signal generators - low frequency, function, pulse and R F generators, sweep frequency generators, arbitrary waveform generators -Graphic recording instruments - strip chart and XY recorders, plotters, digital waveform recorders and analyzers.

Module 4 (13 **Hours)**
Storage oscilloscopes—various controls and measurement techniques, oscilloscope probes, Waveform analyzing instruments—distortion meter, spectrum analyzer. Thermocouple instruments—peak response voltmeter—true RMS meters, low level voltmeter/ammeter.

Text Book:
(Module l): John *P Bentley: Principles of Measurement systems,* Pearson Education

(Modules 2,3,4): David A Bell: *Electronic Instrumentation and measurements,* PHI

References:
1. Oliver B M & Cage: *Electronic Measurements & Instrumentation,* TMH
2. Cooper W: *Electronic Instrumentation and Measurement Techniques,* PHI
3. Joseph J Carr: *Elements of Electronic Instrumentation and Measurement,* Pearson

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module l with choice to answer any one.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 506: MICROPROCESSORS & MICROCONTROLLERS

3 hours lecture and I hour tutorial per week

Objectives:

To introduce the student with knowledge about architecture, interfacing and programming with 8086 and 8051. With this paper, the student should be able to design microprocessor / microcontroller based system (both hardware and software) for any relevant application.

Module 1 (13 Hours)

Software Architecture of the 8086/8088 microprocessors - Address space, Data organization, registers, memory segmentation, & addressing, stack, I/O space. Assembly language programming and program development.

Module 2 (13 Hours)

8086/88 microprocessor architecture - min/max modes - hardware organization of address space - control signals and I/O interfaces – Memory devices, circuits and subsystem design - various types of memories, wait state and system memory circuitry.

Module 3 (13 Hours)

I/O interface circuits - handshaking, parallel printer Interfacing – Address decoding - Interfacing chips - Programmable peripheral interface (8255) - Programmable communication interface (8251) - Programmable timer (8253) - DMA controller (8237/8257) - Programmable interrupt controller (8259) - Keyboard display interface (8279)

Module 4 (13 hours)

Intel *805*1 microcontroller.- CPU operation - Memory space - Software overview - Peripheral overview - Interrupts - timers - parallel port inputs and outputs - Serial port - Low power Special modes of operation

Text books

1. Hall D. V., *Microprocessors & Interfacing,* McGraw Hill
2. Hintz K.J. & Tabak D., Microcontrollers-Architecture, Implementation & Programming, McGraw Hill.

Reference books

1. Intel Data Book Vol. 1, *Embedded Microcontrollers and Processors*
2. Tribel W.A. & Singh A.. *77ie 8088 and 8086 Microprocessors,* McGraw Hill
3. Mohammed R., *Microprocessors & Microcomputer Based System Design*, Universal Bookstall

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module I with choice to answer anyone.
QIII-2quesIiorisAandBofl5rnarksrrommodulelIwith choice to answer any one.
QIV- 2 questions A and B of l5 marks from module III with choice to answer any one.
QV- 2 questions A and B of 15 marks from module IV with choice to answer any one

EC04 - 507(P): LINEAR INTEGRATED CIRCUITS LAB

3 hours practical per week

Objective:

To Design and set up different Electronic Circuits using operational amplifiers

1. Measurement of op-amp parameters - CMRR, slew rate, open loop gain, input and output impedances
2. Inverting and non-inverting amplifiers, integrators and differentiators - frequency response
3. Comparators- Zero crossing detector- Schmitt trigger- precision limiter
4. Instrumentation amplifier - gain, CMRR and input impedance
5. Single op-amp second order LFF and HPF - Sallen-Key configuration
6. Narrow band active BPF - Delyiannis configuration
7. Active notch filter realization using op-amps
8. Wein bridge oscillator with amplitude stabilization
9. Astable and monostable multivibrators using op-amps
10. Square, triangular and ramp generation using op-amps
11. Voltage regulation using IC 723
12. Astable and monostable multivibrators using IC 555
13. Design of PLL for given lock and capture ranges & frequency multiplication
14. Log and Antilog amplifiers

Internal work assessment

60%-Laboratory practical and record
30%- Test/s
10%- Other measures like regularity and participation in class
Total Marks = 50.

EC04 - 508(P): ANALOG COMMUNICATION LAB

3 hours practical per week

Objective:

To design and setup circuits for Analog communication

1. AM generation
2. AM detection with simple and delayed AGC
3. Balanced modulator for DSB-SC signal
4. Mixer using JFET/B JT
5. FM generation (reactance modulator)
6. FM demodulation
7. PAM generation and demodulation
8. Generation and demodulation of PWM and PPM
9. Implementation of intermediate frequency amplifier
10. FM demodulation using PLL
11. AM generation and demodulation using opamps /IC multipliers
12. SSB generation and demodulation using integrated circuits

Internal work assessment
60%-Laboratory practical and record
30%- Test/s
10%- Other measures like regularity and participation in class
Total Marks = 50

SIXTH SEMESTER

EC04 - 601: ENGINEERING ECONOMICS & PRINCIPLES OF MANAGEMENT

3 hours practical per week

(Common with AI 04 601 BM 04 601, EE04 601,CE04 601)

PART A: ENGINEERING ECONOMICS

Objective:
To create general awareness on the basic principles of Economics with special reference to India.

Module I (13 Hours)

1. Introductory Background-Nature and scope of Economics, Science, Engineering and Technology, their relationship with economic development.
2. Basic Economic Concepts - Wants and utility, Demand and supply, Elasticity of demand and supply, concept of cost and revenue, concept of equilibrium and margin, wealth and capital.
3. Money and Banking - Functions of money - Functions of banks -Commercial and Central Banks. Monetary policy of the Reserve Bank of India.

Module II (13 Hours)

4. Industrialisation and Economic Planning in India - Need for industrialization, Development of Indian Industry since independence, Role of public sector in India, Industrial Policy of the Government of India. A brief study of Five Year Plans of India.
5. Agriculture - Role of Agriculture in Indian Economy - Problems of Indian Agriculture - Green Revolution in Indian Features and effects.
6. Foreign exchange and International Trade - Determination of rate of exchange - Balance of payments and Trade - India's Foreign Trade Policy - A short note on International Monetary Fund (I.M.F.).

PARTS: PRLNCIPLES OF MANAGEMENT

Objective:
An elementary level exposure of management principles relevant for industrial sector.

Module III (13 hours)
Need for management - principles of management - management functions -span of control - delegation - directing - leadership and motivation (basic concepts only)

Theories of scientific management (an overview only expected) - Fredric Taylor's theory - Frank Gilbreth's theory - Henry Foyal's theory - present concepts of management.
Financial management - objectives and functions - time value of money (numerical examples included) - basics of financial accounting (problem solving not required) - profit and loss account - balance sheet (only introduction) -sources of industrial finance - shares - debentures - public deposits - bank loans - financial institutions.

Module IV (13 hours)
Marketing management -concept of market and marketing - marketing mix - market research - advertising and sales promotion.
Scope and objective of Human Resource Management - manpower recruitment analysis - recruitment and training -job analysis -job evaluation - wages and incentives.
Decision making - Introduction and definition - techniques of decision making - decision making process - under certainty, uncertainty and risk (problems not included).
Network analysis - CPM and PERT (analysis of simple networks).

Text Books
1. F. Mazda, *Engineering management,* Addison Wesley, Longman Ltd., 1998
2. O. P. Khanna, *Industrial Engineering and Management,* Dhanpat Rai and Sons, Delhi, 2003.
3. P. Kotler, *Marketing Management: Analysis, Planning, Implementation and Control,* Prentice Hall, New Jersey, 2001
4. Venkata Ratnam C.S & Srivastva B.K, *Personnel Management and Human Resources,* Tata McGraw Hill.
5. Prasanna Chandra, *Financial Management: Theory and Practice,* Tata McGraw Hill.
6. K.K.Dewett, Modem, Economic Theory
7. Ishwar.C.Dhingra, The Indian Economy (Resources Planning development and Problem)

Reference Books
1. Koontz H, O'Donnel C & Weihrich H, Essentials of Management, McGraw Hill.
2. Satya Raju R & Parthasarathy A, Management: Text & Cases, Prentice Hall.
3. Ramaswamy V.S &Namakumari S, Marketing Management; Planning, Implementation and Control, MacMillan.

Internal assessment:

Assignments		=	15 Marks

Economics: Assignments should help students to appreciate necessity of economics in Engineering Management: individual documentation of best management practices by various organizations

2 Tests	2x15	=	30 Marks
Regularity		=	05 Marks
Total		=	50 Marks

University examination Pattern:
(Part A and Part B should be written on separate answer books)
Part A
QI - 4 short type questions of 5 marks each module
QII - 2 questions A and B of l5 marks each, 2 from module with module I with choice to answer any one
QIII - 2 questions A and B of l5 marks, 2 from module II with choice to answer any one.

Part B
QI - 4 short type questions of 5 marks each module.
QII - 2 questions A and B of l5 marks, 2 from module III with choice to answer any one
QIII- 2 questions A and B of 15 marks each, 2 from module IV with choice to answer any one.

EC04 - 602: DIGITAL SIGNAL PROCESSING

3 hours lecture and 1 hour tutorial per week

Objectives:

To provide basic ideas (i) in the transforms used in digital domain (ii) in the design and hardware realization of digital filters

Module 1 (13 Hours)

Review of Discrete Fourier Series and Discrete-Time Fourier Transform -Frequency domain sampling and reconstruction of discrete time signals - The Discrete Fourier Transform - DFT as a linear transformation - relationship to other transforms - properties of DFT - Linear filtering methods based on DFT - frequency analysis of signals using DFT- Efficient computations of the DFT-Fast Fourier Transform algorithms - direct computation, divide-and-conquer approach, radix-2, radix-4 and split radix algorithms - implementation of FFT algorithms -Applications of FFT-Wavelet transforms (Introduction only)

Module 2 (13 Hours)

Structures for realization of discrete time systems - structures for FIR and IIR systems - signal flow graphs, direct-form, cascade-form, parallel form, frequency sampling, lattice and transposed structures-representation of numbers & errors due to rounding and truncation - Quantization of filter coefficients - round off effects in digital filters - limit cycle oscillations, scaling for overflow prevention.

Module 3 (13 Hours)

Design of digital filters - general considerations - causality and its implications, characteristics of practical frequency selective filters - design of FIR filters -symmetric and antisymmetric, linear phase-design of IIR filters from analog filters - using approximation of derivatives, impulse invariance, bilinear transformation, matched-z transformation, characteristics of standard filters and their designs - Frequency transformations in the analog and digital domains.

Module 4 (13 Hours)

Computer architectures for signal processing - Harvard architecture, pipelining, multiplier-accumulator, special instructions for DSP, replication, on chip storage, extended parallelism - general purpose DSP Processors - implementation of DSP algorithms for various operations - special purpose DSP hardware -hardware digital filters and FFT processors - case study and overview of TMS 320 series processor.

Text Books:

1. John . Proakis & Dimitris G. Manolakis: *Digital Signal Processing-Principles, Algorithms and Applications,* Pearson/PHI
2. Emmanuel C. Ifeacher & Barrie W. Jervis: *Digital Signal Processing - A. Practical Approach,* Addison Wesley

References:

1. Oppenheim A. V., Schafer R. W. & Buck J. R.-, *Discrete Time Signal Processing,* PHI/Pearson
2. Mitra S. K., *Digital Signal Processing: A Computer Based Approach;* Tata McGraw Hill
3 B. Venkataramani & M. Bhaskar, *Digital Signal Processors -Architecture,programming and Applications,* Tata McGrawHill
4. Rao R M and Bopardikas A S *Wavelet transforms - Introduction*

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII- 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
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of 15 marks from m module IV with choice to answer any one

EC04 - 603: CONTROL SYSTEMS

3 hours lecture and 1 hour tutorial per week

Objectives:

To provide the basic theory behind the analysis of continuous and discrete systems in time and frequency domains. This paper also introduces concepts about the state space modeling of systems.

Module I (13 hours)

General Schematic Diagram of Control Systems-Open loop and Closed loop systems- Merits and demerits- Concept of feed back- Role of computers in Automatic Control-Modeling of Continuous Time Systems. Basic ideas of Functions of Complex Variables, Mapping Process, Analytic functions, Poles and Zeros-Laplace Transforms- Properties.

Transfer functions - block diagrams-order and type-signal flow graph- Mason's Gain formulae-Block diagram reduction using direct techniques and signal flow graphs-examples- derivation of transfer function of simple systems from physical relations - low pass RC filter - RLC series network - spring mass damper - DC servomotor for position and speed control - low pass active filter -

Module II (15 hours)

1. **Time Domain analysis:**

   Analysis of Continuous Time systems-Transient and Steady State Responses- Standard Test Signals- Response comparisons for various Root locations in the S-plane -Time Domain Solutions of First Order Systems-Step Response of Second order system- Time domain specifications- Relationships between Damping ratio and the amount of Overshoot for a Second Order system.

   - Effect of Derivative and Integral Control on the Transien
   - Performance of feed back Control systems.
   - Steady State Response -steady state error -computation of S. S. error- error constants.
   - Concept of Stability- Routh - Hurwitz Criterion.
   - Construction of Root locus.

2. **Freqency Domain Analysis:**

   Frequency Domain Plots- Polar and Bode Plots- Theory of Nyquist Criterion-Frequency Response characteristics-frequency domain specifications-computation of Gain and Phase Margins from Bode plot-Theory of Lag ,Lead, and Lag - Lead compensators.

Module III (12 hours)

Modeling of discrete - time systems - sampling - mathematical derivations for sampling - sample and hold - Z-transforms-properties - solution of difference equations using Z - transforms - examples of sampled data systems - mapping between s plane and z plane - cyclic and multi-rate sampling (definitions only) - analysis of discrete time systems - pulse transfer function - examples – stability - Jury's criterion - bilinear transformation - stability analysis after bilinear transformation - Routh-Hurwitz techniques -

Module IV (12 hours)

State Space Analysis: Introduction- Definitions and explanations of the terms] STATE, STATE VARIABLES, STATE VECTOR and STATE SPACE-State Space Representations of Linear Time -invariant System with i) single input and output ii) multi variable systems iii)SISO System in which forcing function involves derivative terms also - Non uniqueness of a set of state variables -Eigen values - Phase variable and Diagonal forms - Invariance of Eigen values under linear transformation - Diagonilisation.

Solutions of Linear Time-invariant State Equations- Homogeneous and Non-homogeneous case (examples up to second order only) - Matrix Exponential-Laplace Transform approach to the solution of state equations-State Transition Matrix-properties.

State Space representation of Discrete Time Systems

Relation between Transfer function / Transfer Matrix and State Space models' for continuous and discrete cases.

Text Book:

1. Ogata K., "Modern Control Engineering", Prentice Hall India
2. B.C Kuo., "Automatic Control System", Prentice Hall India
3. Nagarath I. J. & Gopal M., "Control System Engineering", Wiley Eastern Ltd

Reference Books

1. Ziemer R.E., Tranter W.H. & Fannin D.R., "Signals and Systems", Pearson Education Asia
2. Dorf R.C. & Bishop R.H., *"Modern Control Systems"*, Addison Wesley
3. Ogata K.., "Discrete Time Control Systems", Pearson Education Asia
4. Kuo B.C., "Digital Control Systems", Oxford University Press

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks -50.

University examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII- 2 questions A and B of 15 marks from module l with choice to answer anyone.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV - 2 questions A and B of 15 marks from module lV with choice to answer anyone.

EC04 - 604: DIGITAL COMMUNICATION

3 hours lecture and 1 hour tutorial per week

Objectives:
To study the theoretical aspects of analyzing digital communication systems with different modulation schemes.

Module I (13 hours)
Analog pulse modulation - sampling theorem for bandpass signals - pulse amplitude modulation - generation and demodulation - PAM/TDM system -PPM generation and demodulation - PWM - spectra of pulse modulated signals - SNR calculations for pulse modulation systems - waveform coding -quantization - PCM - DPCM - delta modulation - adaptive delta modulation - line coding schemes - ON-OFF, NRZ, Bipolar - Manchester signaling and differential encoding

Module II (13 hours)
Shaping - Nyquist criterion for zero ISI - signalling with duobinary pulses - eye diagram - equalizer, scrambling and descrambiing - signal space concepts -geometric structure of the signal space - L^2 space - distance, norm and inner product - orthogonality - gram-base band data, transmission - matched filter receiver - inter symbol interference - Gram - schmidt orthogonalization procedure

Module III (13 hours)
Review of Gaussian random process - optimum threshold detection - optimum receiver for AWGN channel - matched filter and correlation receivers - decision procedure - maximum a-posteriori probability detector - maximum likelihood detector - probability of error - bit error rate - optimum receiver for coloured noise - carrier and symbol synchronization

Module IV (13 hours)
Digital modulation schemes - coherent binary schemes - ASK, FSK, PSK, MSK coherent M-ary schemes - calculation of average probability of error for different modulation schemes - power spectra of digitally modulated signals - performance comparison of different digital modulation schemes

Text books

1. Simon Haykin, *Communication Systems,* John Wiley
2. Lathi B.P., *Modern Digital and Analog Communication,* Oxford University Press
3. Sklar, *Digital Communication,* Pearson Education

References books

1. Sam Shanmugham K.; *Digital and Analog Communication Systems,* John Wiley
2. Ziemer R.E. & Tranter W.H., *Principles of Communications,* JAICO Publishing House
3. Taub H. & Schilling, *Principles of Communication Systems,* TMH
4. Proakis J.G., *Digital Communications,* McGraw Hill
5. Pierre Lafrance, *Fundamental Concepts in Communication,* Prentice Hall India
6. Couch, *Analog and Digital Communication:* Pearson Education.

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII- 2 questions A and B of 15 marks from module l with choice to answer anyone.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV - 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 605: POWER ELECTRONICS

3 hours lecture and 1 hour tutorial per week

Objectives:
This paper introduces the basic components and systems used in power electronics. Students should be able to design and analyze typical power electronics systems.

Module I (13 hours)
Power diodes - basic structure and V-I characteristics - various types - power transistors - B JT, MOSFET and IGBT - basic structure and V-I characteristics -thyristors - basic structure - static and dynamic characteristics - device specifications and ratings - methods of turning on - gate triggering circuit using UJT - methods of turning off- commutation circuits - TRIAC

Module II (13 hours)
Line frequency phase controlled rectifiers using SCR - single phase rectifier with R and RL loads - half controlled and fully controlled converters with continuous and constant currents - SCR inverters - circuits for single phase inverters - series, parallel and bridge inverters - pulse width modulated inverters
- basic circuit operation

Module III (13 hours)
AC regulators - single phase ac regulator with R and RL loads - sequence control of ac regulators - cycloconverter - basic principle of operation - single phase to single phase cycloconverter - choppers - principle of operation - step-up and step-down choppers - speed control of DC motors and induction motors

Module IV (13 hours)
Switching regulators - buck regulators - boost regulators - buck-boost regulators cuk regulators - switched mode power supply - principle of operation and analysis - comparison with linear power supply - uninterruptible power supply basic circuit operation - different configurations - characteristics and applications.

Text
1. Ned Mohan et. al., *Power Electronics,* John Wiiey

References

1. Sen PC, *Power Electronics.,* Tata McGraw Hill
2. Dubey et. al. G.K., *Thyristorised Power Controllers.* Wiley Eastern Ltd.
3. Dewan & Straughen, *Power Semiconductor Circuits,* John Wiley
4. Singh M.D. & Khanchandani K.B., *Power Electronics,* Tata McGraw Hill
5. Lander C.W., *Power Electronics,* McGraw Hill
6. Sen P.C., *Modern Power Electronics,* Wheeler Publishers

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern
QI - 8 short type questions of 5 marks, 2 from each module
QII- 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 ll with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one.
QV- 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 606: RADIATION AND PROPAGATION

3 hours lecture and 1 hour tutorial per week

Objectives:

This paper provides the basic ideas' on radiating structures, their arrays and designs, and different wave propagation modes.

Module I: Antenna fundamentals (13 hours)

Source of radiation - radiation from accelerated charges - oscillating electric dipole - power radiated by a current element - radiation from a half wave dipole - antenna field zones (analysis) - antenna parameters - patterns - beam area -radiation intensity - beam efficiency - directivity - gain - effective aperture -effective height - self impedance - mutual impedance - antenna theorems -reciprocity theorem - Babinet's principle

Module II: Antenna arrays (13 hours)

Linear antenna arrays - two element array of isotropic point sources - amplitude and phase characteristics - pattern multiplication - N-element array - analysis and design of broad - side array - end-fire array - binomial array and Dolph-Tchebyscheff array

Module III: Special antennas (13 hours)

Travelling wave antenna - long wire - V and rhombic antennas - broad band dipole - folded dipole antenna - broad band antennas - Yagi-Uda antenna and horn antenna - reflector antenna - parabolic reflector antenna - cassegrain antenna - frequency independent antenna - log periodic antenna microstrip antenna

Module IV: Radio wave propagation (13 hours)

Ground wave propagation - reflection from earth - space wave - surface wave -spherical earth propagation - tropospheric waves - ionospheric propagation -ionosphere - plasma oscillations - wave propagation in plasma - reflection and refraction of waves by the ionosphere - critical frequency - virtual height

Text books

1. Jordan & BALMAIN, *Electromagnetic Waves and Radiating Systems,* Prentice Hall of India.

Reference books

1. Kraus J.D., *Antenna Theory,* McGraw Hill
2. Balanis C. A., *Antennas,* McGraw Hill
3. Collin R.E., *Antennas & Radio Wave Propagation,* McGraw Hill .
4. Ramo & Whinnery, *Fields & Waves in Communication Electronics,* John Wiely

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q l - 8 short type questions of 5 marks, 2 from each module.
QII - 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.
Q]V - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module lV with choice to answer anyone.

EC04 - 607(P): MICROPROCESSOR & MICROCONTROLLERLAB

3 hours practical per week

Objective:

To acquaint the students with the following skills:

- Assembly Language programming & Interfacing based on 8085 / 8086 Micro processors and 8051 Microcontroller.

List of experiments

1. 8086 kit familiarization and basic experiments
2. Programming exercise using BCD and Hexadecimal numbers
3. Programming exercise: sorting, searching and string
4. Interfacing with A/D and D/A converters
5. Interfacing with stepper motors
6. IBM PC programming: Basic programs using DOS and BIOS interrupts
7. Interfacing with PC: Serial communication and Parallel printer interfacing

Interfacing experiments using 8051

8. Parallel interfacing I/O ports (Matrix keyboard)
9. Serial communication with PC
10. Parallel Interfacing - LCD
11. Interfacing with serial EEPROM

Internal work assessment

60%-Laboratory practical and record
30%- Test/s
10%- Other measures like regularity and participation in class
Total Marks = 50

EC04 - 608(F): MINI PROJECT

3 hours practical per week

Objective:
To improve the professional competency of the students and estimate their ability to transform theoretical knowledge acquired so far into a working model which would help them to solve real life problems related to industry and research.

Each group consisting of four members is expected to design and develop a moderately complex hardware system. A working model of the hardware system should be fabricated and tested.
The guide will monitor the project work and evaluation will be done by him accordingly.
The assessment of all mini-projects will be done by a committee consisting of HOD , Mini-project Co-ordinator and two faculty members, specialized in various fields of Electronics and Communication Engineering. The students will present and demonstrate the project work before the committee.
Sixty Percent of total marks will be awarded by the guide and the remaining forty percent will be awarded by the evaluation committee.

A detailed report certified by the guide and Head of the department is to be submitted.

Sessional work Assessment:

Design and development	:	15
Regularity and Participation	:	05
Report	:	10
Demonstration	:	20
(to be awarded by the Evaluation Committee)		
TOTAL MARKS	:	50

SEVENTH SEMESTER

EC04 701: INFORMATION THEORY AND CODING

3 hours lecture and 1 hour tutorial per week

Objectives: This paper provides basic concepts of Information theory, which is the fundamental for electronic communications. The student should be able to propose, design and analyse suitable coding/decoding scheme for a particular digital communication application.

Module I (13 hours)
Information theory - information and entropy - properties of entropy of a binary memoryless source - extension of a binary memoryless source - source coding theorem - Shannon fano coding - Huffman coding - Lempel ziv coding - discrete memoryless source - binary symmetric channel - mutual information - properties
- channel capacity - channel coding theorem

Module II (13 hours)
Coding - linear block codes - generator matrices - parity check matrices – encoder - syndrome and error correction - minimum distance - error correction and error detection capabilities - cyclic codes - coding and decoding

Module III (13 hours)
Introduction to algebra - groups - fields - binary field arithmetic - construction of Galois field - basic properties - computations - vector spaces - matrices - BCH codes - description - decoding - reed solomon codes

Module IV (13 hours)
Coding - convolutional codes - encoder - generator matrix - transform domain representation - state diagram - distance properties - maximum likelihood decoding - viterbi decoding - sequential decoding - interleaved convolutional codes - Turbo coding - Trellis coding.

Text books

1. Simon Haykins, *Communication Systems,* John Wiley
2. Shu Lin, Costello D.J., *Error Control Coding - Fundamentals and Applications,* Prentice Hall Inc. Englewood Cliffs

Reference books

1. Das J., Malik A.K., Chatterjee P.K., *Principles of Digital Communications,* New Age International
2. Simon Haykin, *Digital Communications,* John Wiley
3. Taub & Schilling, *Principles of Communication System,* Tata McGraw Hill
4. Tomasi, *Electronic Communication, Fundamentals Through Advanced,* Pearson education
5. Sklon, *Digital Communication,* Pearson Education
6. Couch, *Digital and Analog Communication System,* Pearson Education

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q l -8 Short type questions of 5 marks, 2 from each module.
QII - 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 anyone.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 702: MICROWAVE DEVICES AND COMMUNICATION

3 hours lecture and 1 hour tutorial per week

Objectives: With this paper, student should be able to understand the working principle and use of various microwave components and semiconductor devices. This paper also provides the basic aspects of terrestrial and satellite microwave communication links.

Module I (13 hours)

Theory of waveguide transmission - rectangular waveguides - TE modes - TM modes - waveguide components - rectangular cavity resonator - circular cavity resonator (only basic ideas) - E-plane tee - magic tee - isolator - circulator -directional coupler - S matrix

Module II (13 hours)

Microwave linear beam tubes - klystron (bunching, output power and loading) - reflex klystron - traveling wave tube (amplification process, convection current, axial electric field, gain) - microwave crossed field tubes - magnetron (operation, characteristics and applications)

Module III (13 hours)

Semiconductor microwaves devices - microwave transistors - tunnel diodes and FETs - transferred electron devices - Gunn effect diodes - (Gunn effect, operation, modes of operation, microwave generation and amplification) - LSA diodes - InP diodes - Cd Te diodes - avalanche transit time devices - read diodes - impatt diodes - trapatt diodes - baritt diodes

Module IV (13 hours)

Terrestrial microwave communication - basic principles of microwave links -link analysis - microwave relay systems - choice of frequency - line of sight and over the horizon systems - modulation methods - block schematic of terminal transmitters and receivers - effect of polarization - diversity receivers - digital microwave links - digital modulation schemes - fading - digital link design -satellite communication - orbit of communication satellites - angle of elevation - propagation delay - orbital spacing - satellite construction - transponders - antennas - multiple spot beams - earth station - link analysis - multiple access schemes - digital satellite links

Text books

1. Liao S. Y., *'"Microwave devices and Circuits"*, Prentice Hall of India
2. Gagliardi R.M., *Satellite Communication*, CBS Publishers

Reference books

1. Rizzi P.A., *"Microwave Engineering*, Passive Circuits Hall of India
2. Pozar D.M., *"Microwave Engineering"*, John Wiley
3. Kamilo Feher, *Digital Communications*, Microwaves applications, PHI
4. Chatterji R., *Microwave Engineering*, Special topics, East West Press

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

Q l - 8 short type questions of 5 marks, 2 from each module.
QII- 2 questions A and B of 15 marks from module l with choice to answer any one.
QIII- 2questionsAandB of 15 marks from module II with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 703: OPTICAL COMMUNICATION SYSTEMS

3 hours lecture and 1 hour tutorial per week

Objectives: This paper provides the basic theory of optical fibers and principle of various components in optical communication system. Student should be able to design the components with specifications for a given fiber optic communication system.

Module I (13 hours)

Solution to Maxwell's equation in a circularly symmetric step index optical fiber - linearly polarized modes - single mode and multimode fibers - concept of V number - graded index fibers - total number of guided modes (no derivation) -polarization maintaining fibers - attenuation mechanisms in fibers - dispersion in single mode and multimode fibers - dispersion shifted and dispersion flattened fibers - attenuation and dispersion limits in fibers - nonlinear self phase modulation effect in single mode fibers

Module 11(13 hours)

Optical sources - LED and laser diode - principles of operation - concepts of line width - phase noise - switching and modulation characteristics - typical LED and LD structures - optical detectors - pn detector - pin detector - avalanche photodiode - principles of operation - concepts of responsivity - sensitivity and quantum efficiency - noise in detection - typical receiver configurations (high impedance and transimpedance receivers)

Module III (13 hours)

Intensity modulated direct detection systems - quantum limit to receiver sensitivity - detected signal & shot noise - ISI and equalization - coherent systems - homodyne and heterodyne systems - system structures - coherent systems using PSK, FSK, ASK and DPSK modulations - related noise effects -performance degradation induced by laser phase and intensity noise - degradation due to fiber dispersion - degradation induced by nonlinear effects in fiber propagation

Module IV (13 hours)

Optical amplifiers - semiconductor amplifier - rare earth doped fiber amplifier (with special reference to erbium doped fibers) - Raman amplifier - Brillouin amplifier - principles of operation - amplifier noise - signal to noise ratio - gain – gain bandwidth - gain and noise dependencies - intermodulation effects -saturation induced crosstalk - wavelength range of operation

Reference books

1. Kazovsky L., Benedetto S. & Willner A., *Optical Fiber Communication Systems'*, Artech House
2. John Senior, *Optical Fiber Communications*, PHI
3. Betti S., Marchis G.D. & Eugenio Iannone, *'Coherent Optical Communications Systems*', John Wiley
4. Gerd Kaiser *'OpticalFiber communications',*

Internal work assessment

60% - Test Papers (Minimum 2)
30% -Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

QI -8 Short type questions of 5 marks, 2 from each module.
QII - 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.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 704: COMPUTER COMMUNICATION & NETWORKING

3 Hours lecture and 1 hour tutorial per week

Objectives: This paper should provide a good background in queuing theory and characteristics of important computer networks and protocols.

Module I (13 hours)
Characteristics of communication networks - traffic characterization and quality of service CBR, VBR, UBR traffic - network services - flow control - congestion control - error control - error detection - ARQ retransmission strategies – analysis - OSI model - Ethernet - token ring - FDDI - DQDB - frame relay - IPV4, IPV6

Module II (13 hours)
TCP/UDP - TCP congestion control - congestion avoidance - window adjustment m TCP - routing optimization in datagram networks - circuit switched networks - SONET - SDH- routing optimization in circuit switched networks.

Module III (13 hours)
Introduction to queueing theory - Markov chain - discrete time and continuous time Markov chains - poisson process - queueing models for datagram networks - Little's theorem - M/M/l queueing system - M/M/m/m queueing models -infinite server case - M/G/l queue - mean value analysis

Module IV (13 hours)
ATM networks - main features - statistical multiplexing - addressing, signaling and routing - ATM header structure - ATM adaptation layer - IP over ATM

Text books

1. Jean Walrand & Pravin Varaiya, *"High Performance Communication Networks"*. Morgan Kaufman Publishers
2. Bertsekas D. & Gallager R., *"Data Networks"*, Prentice Hall of India
3. Peterson L.L. & Davie B.S., *"Computer Networks: A System Approach"*, Morgan Kaufman Publishers
4. Tannenbaum A., *"Computer Networks"*, Prentice Hall

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
Q**1** -8 Short type questions of 5 marks, 2 from each module.
QII - 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 anyone.
QIV - 2 questions A and B of 15 marks module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 705 (A): SOFTWARE ENGINEERING

(Common for IC, AE, BM)

3 hours lecture and 1 hour tutorial per week

Objectives:

(i)To make awareness about the different stages in the software development process, quality management, software metrics, cost estimation and CASE tools.

(ii)To understand the full features of object oriented design starting from specifications, based on a typical case study.

After studying this paper the students should have known most of the tips in managing the software development process.

Module I (13 hours)

Introduction - FAQs about software engineering - professional and ethical responsibility - system modeling - system engineering process - *the software process* - life cycle models - iteration - specification - design and implementation - validation - evolution - automated process support - *software requirements* - functional and non-functional requirements - user requirements - system requirements - SRS - *requirements engineering processes* ~ feasibility studies - elicitation and analysis - validation - management - *system models* – context models - behavior models -.data models - object models - CASE workbenches

Module II (13 hours)

Software prototyping - prototyping in the software process - rapid prototyping techniques - *formal specification* - formal specification in the software process -interface specification - behavior specification - *architectural design* – system structuring - control models - modular decomposition - domain-specific architectures - distributed systems architecture - *object-oriented design* – objects and classes - an object oriented design process case study - design evolution - *real-time software design* - system design - real time executives - *design with reuse* - component-based development - application families - design patterns - *user interface design* - design principles - user interaction – information presentation - user support - interface evaluation.

Module III (13 hours)

Dependability - critical systems - availability and reliability - safety - security -critical systems specifications - critical system development - *verification and validation* - planning - software inspection - automated static analysis -clean room software development - *software testing* - defect testing - integration testing - object-oriented testing - testing workbenches - critical system validation - *software evolution* - legacy systems - software change - software maintenance - architectural evolution - software re-engineering - data re-engineering

Module IV (13 hours)

***Software project management*- project planning- scheduling- risk management** -*managing people* - group working - choosing and keeping people - the people capability maturity model - *software cost estimation* - productivity estimation techniques - algorithmic cost modeling, project duration and staffing *quality management* - quality assurance and standards - quality planning – quality control - software measurement and metrics - *process improvement* - process and product quality - process analysis and modeling - process measurement - process CMM - *configuration management* - planning - change management - version and release management - system building - CASE tools for configuration management.

Text book

1. Ian Sommerville, *Software Engineering,* Pearson Education Asia

Reference books

1. Pressman R. S., *Software Engineering,* McGraw Hill
2. Mall R., *Fundamentals of Software Engineerings* Prentice Hall of India
3. BehferoozA. *ScHudsonFJ., Software Engineering Fundamentals,* Oxford University Press
4. Jalote P., *An Integrated Approach to Software Engineering,* Narosa

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q 1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 anyone.
QIV - 2 questions A and B of 15 marks module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 705 (B): IMAGE PROCESSING

3 hours lecture and 1 hour tutorial per week

Objectives:
To make the students aware of digital image model, different types of image processing requirements and use of various mathematical transforms for such processing.

Module I (13 hours)
Basic ideas in digital image processing - problems and applications - image representation and modeling - two dimensional systems - shift in variant linear systems - two dimensional Fourier transform and its properties - optical theory and modulation transfer functions - matrix theory - block matrices and Kronecker products - random fields - spectral density function

Module II (13 hours)
Image perception - light, luminance, brightness and contrast - MTF of the visual system - visibility function - monochrome vision models - image fidelity criteria - colour representation - colour matching and reproduction - colour co-ordinate systems - colour difference measures - colour vision models - temporal properties of vision - image sampling and quantization - image scanning - display and recording - two dimensional sampling - practical limitations - image quantization basic ideas

Module III (13 hours)
Unitary image transforms - basic ideas - two dimensional DFT - cosine transform - sine transforms - hardamard transform - harr transform - slant transform - KL transform - SVD transform - image enhancement - point operations - histogram equalization and modification - spatial operations - transforms operations -multispectral image enhancement - colour image enhancement

Module IV (13 hours)
Image restoration - image observation models - inverse filtering - wiener filtering Image compression - pixel coding - predictive coding - transform coding - basic ideas

Text books

!. Jain A.K., *"Fundamentals of Digital Image Processing "* PHI
2. Pratt W.K., *"Digital Image Processing* ", John Wiley

Reference books

1. Gonzalez R.C. & Woods R.C., *"Digital Image Processing",* Addison Wesley
2. **Azriel** Rosenfeld & Kak A.C., *"Digital Picture Processing",* **VoI.I&2,** Academic Press
3. Netravalli A.N. & Hasbell B.G., *"Digital'Pictures-Representation Compression and Standards ",* Plenum Press
4. Dougherty E.R. (Ed), *"Digital Image Processing Methods",* Marcel Dekker Inc.

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q **1** - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 anyone.
QIV - 2 questions A and B of 15 marks module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 705(C): MANAGEMENT INFORMATION SYSTEM

3 hours lecture and 1 hour tutorial per week

Objective:
To Create general awareness and exposure of management principles relevant for industrial sector.

Module I (12 Hours)
Information systems- Functions of management- Levels of management- Frame work for information systems- Systems approach- Systems concept- Systems and their environment- Effects of system approach in information system design- Using systems approach in problem solving-Strategic uses of information.

Module II (10 Hours)
An overview of computer hardware and software components- File and database management systems- Introduction to network components-Topologies and types- remote access- The reasons for managers to implement networks- Distributed systems- The internet and office communications.

Module III (14 Hours)
Application of information systems to functional- Tactical and strategic areas of management, decision support systems and expert systems.

Module IV (16 Hours)
Information systems planning- Critical success factor- Business system planning- Ends/means analysis- Organizing the information system plan- Systems analysis and design- Alternative application development approaches- organization of data processing- Security and ethical issues of information systems.

Text Books

1. Robert Schulters & Mary Summer- Management Information Systems: The Manager's View, Tata McGraw Hill

Reference Books.

1. London K.C. & Landon P.J.- Management Information Systems: Organization and technology, Prentice Hall of India
2. Sadagopan S.- Management Information Systems, Prentice Hall of India.
3. Basandra S.K.- Management Information Systems, Wheeler Publishing.
4. Alter S.- Information Systems: A Management Perspective, Addison Wesley.
5. Effy Oz- Management Information Systems, Vikas Publishing House.

Internal work assessment
60% - Test Papers (Minimum 2)
30% -Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
Q **1** - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 anyone.
QIV - 2 questions A and B of 15 marks module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 – 705 (D): SATELLITE COMMUNICATION SYSTEMS

3 hours lecture and 1 hour tutorial per week

Objectives:

With this paper, the students should have thoroughly known about the principle of earth station, satellite link, communication satellites, satellite orbits and different types of channel accessing mechanisms.

Module I (13 hours)

Satellite orbits - solar day and sidereal day - orbital parameters - satellite trajectory - period, velocity and position of a satellite - geostationary satellites - non- geostationary constellations - launching of geostationary satellites – Hohmann transfer - effect of earth's shape - other heavenly bodies - atmospheric drag and radiation pressure on the satellite's orbit

Module II (13 hours)

Communication satellites - spacecraft subsystems - payload - repeater, antenna, attitude and control systems - telemetry, tracking and command - power sub system and thermal control

Earth stations - antenna and feed systems - satellite tracking system – amplifiers - fixed and mobile satellite service earth stations.

Module III (13 hours)

Communication link design - frequency bands used - antenna parameters - transmission equations - noise considerations - link design - very small aperture terminals (VSAT) - VSAT design issues.

Module IV (13 hours)

Multiple access techniques - frequency division multiple access - time division multiple access - code division multiple access - access protocols for data traffic.

Reference books

1. Richharia M., *Satellite Communication Systems,* Macmillan Press Ltd.
2. Gagliardi R.M., *Satellite Communication,* CBS
3. Ha T.T., *Digital Satellite Communication,* MGH

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10%- Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII.- 2 questions A and B of 15 marks from module 1 with choice ton answer any one.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV - 2 questions A and B of l5 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module lV with choice to answer any one.

EC04 - 705(E): DIGITAL MOS CIRCUITS

3 Hours lecture and 1 hour tutorial per week

Objectives: After studying this paper students should be aware of design and simulation of logic gates belonging to different types of CMOS logic families.

Module I (11 hours)
Short and narrow channel effects in MOS transistor (MOST) – subthrehold current - channel length modulation - drain induced barrier lowering - hot electron effects - velocity saturation of charge carriers
Scaling of MOST - constant voltage and constant field scaling - digital MOSFET model - series connection of MOSFETs

Module II (15 hours)
MOS inverters - resistive load - NMOS load - pseudo NMOS and CMOS inverters - calculation of input high and low and output high and low levels -power dissipation - calculation of delay times for CMOS inverter - CMOS ring oscillator - design of super buffer - estimation of interconnect parasitics and calculation of interconnect delay

Module III (13 hours)
MOS logic circuits - CMOS NOR, NAND, AOI and OAI gates - full adder - SR and JK latches - CMOS latch - transmission gates - simple circuits using TG -basic principles of pass transistor logic - voltage boot strapping - BiCMOS logic circuits - BiCMOS inverter with resistive base pull down and active base pull down - BiCMOS switching transients - simple gates using BiCMOS.

Module IV (13 hours)
Dynamic CMOS logic - precharge/evaluate logic - cascading problem – domino logic - cascading domino logic gates - charge sharing in domino logic – solutions to charge sharing problem - realisation of simple functions using domino logic - NORA logic - true single phase clock dynamic logic - basic ideas of adiabatic logic.

Reference books

1. Sung-Mo Kang & Yusuf Leblebici, *CMOS Digital Integrated Circuits Analysis & Design,* MGH
2. Jacob Baker R., Li H.W. & Boyce D.E., *CMOS- Circuit Design, Layouts Simulation,* PHI
3. Ken Martin, *Digital Integrated Circuit Design,* Oxford Univ. Press
4. Rabaey J.M., *Digital Integrated Circuits - A Design Perspective,* Prentice Hall
5. Yuan Taur & Ning T.H., *Fundamentals of Modern VLSI Devices,* Cambridge Univ. Press

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 Il with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 705(F): NUMERICAL ANALYSIS

(Common for *IC* & AT)

3 hours lecture and 1 hour tutorial per week

Objectives:

After studying this paper the student should be able to obtain the numerical solutions of:

(i) transcendental equations

(ii) linear algebraic equations

(iii) ordinary and partial differential equations.

Module I: Errors in numerical calculations (13 hours)

Sources of errors, significant digits and numerical instability - numerical solution of polynomial and transcendental equations - bisection method - method of false position - Newton-Raphson method - fixed-point iteration - rate of convergence of these methods - iteration based on second degree equation -the Muller's method - Chebyshev method - Graeffe's root squaring method for polynomial equations - Bairstow's method for quadratic factors in the case of polynomial equations

Module II: Solutions of system of linear algebraic equations (13 hours)

Direct methods - gauss and gauss - Jordan methods - Crout's reduction method - error analysis - iterative methods - Jacobi's iteration - Gauss-seidel iteration - the relaxation method - convergence analysis - solution of system of nonlinear equations by Newton-Raphson method - power method for the determination of eigen values - convergence of power method

Module III: Polynomial interpolation (13 hours)

Lagrange's interpolation polynomial - divided differences Newton's divided difference interpolation polynomial - error of interpolation - finite difference operators - Gregory - Newton forward and backward interpolations - Stirling's interpolation formula - interpolation with a cubic spline - numerical differentiation differential formulas-in the case of equally spaced points - numerical integration trapezoidal and Simpson's rules - Gaussian integration - errors of integration formulas

Module IV: Numerical solution of ordinary differential equations (13 hours)

The Taylor series method - Euler and modified Euler methods - Runge-Kutta methods (2^{nd} order and 4^{th} order only) - multistep methods - Milne's predictor -corrector formulas - adam-bashforth & adam-moulton formulas - solution of boundary value problems in ordinary differential equations - finite difference methods for solving two dimensional Laplace's equation for a rectangular region - finite difference method of solving heat equation and wave equation with given initial and boundary conditions.

Reference books

1. Froberg C.E., *Introduction to Numerical Analysis,* Addison Wesley
2. Gerald C.F., *Applied Nufherical Analysis,* Addison Wesley
3. Hildebrand F.B., *Introduction to Numerical Analysis,* T.M.H.
4. James M.L., Smith CM. & Wolford *J.C., Applied Numerical Methods for Digital Computation,* Harper & Row
5. Mathew J.H., *Numerical Methods for Mathematics, Science and Engineering,* P.H.I.

Internal work assessment

60% - Test Papers (Minimum 2)
30% -Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 Il with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 - 706(P) : DIGITAL COMMUNICATION LAB

(3 hours practicals per week)

Objective:

The aim is to give exposure to different communication circuits.

1. Sampling and reconstruction of low pass signals
2. PCM generation
3. Differential PCM generation
4. Implementation of Delta modulator and demodulator
5. Implementation of line coding schemes: bipolar, Manchester and differential codes
6. Equalization and Digital Regeneration
7. Matched filter receiver for rectangular pulse
8. Generation and detection of BASK and BFSK signals
9. Generation and detection of BPSK signals
10. Generation and detection of QAM using IC multipliers
11. Implementation of Analog to Digital Converters.
12. Implementation of Digital to Analog Converters

Internal work assessment
60%-Laboratory practical and record
30%- Test/s
10%- Other measures like regularity and participation in class
Total Marks = 50

EC04 - 707(P) : SEMINAR

3hours per week

Objective:
To assess the debating capability of the student to present a seminar on a technical topic.Also to train a student to face the audience and freely present his ideas without fear thus creating in him self-confidence and courage that are essential for an Engineer.

Each student is expected to give a seminar on a topic of current relevance in Electronics and Communication Engineering. Interdisciplinary topics from related fields viz Electrical, Computer science,Electronic Instrumentation and Bio-medical Engineering are also permitted.Topic that must be selected from standard journals or publications of IEEE or any other professional societies of ECE interest, are to be indicated in the final report.

The seminar report should not be a reproduction of the original paper.

Internal work Assessment:

Qualify of the Topic and preparation of the manuscript	5 Marks
Presentation	25 Marks
Discussion (with audience)	5 Marks
Final Report	10 Marks
Participation (including regularity)	5Marks
TOTAL	50 Marks

EC04 - 708 (P) : PROJECT

4 hours per week

Objective:
To develop an ability in an Engineering student to convert his/her theoretical knowledge into practical systems and also to assess his inherent capabilities and talents in the above task.

The Porject work is for a duration of two semesters .Each student group consisting of not more than five members is expected to design and develop a complete system , which may be either software / Hardware or a combination of both. The project work may be undertaken in Electronics / Communication/Computerscience or any allied area.

Literature survey ,design of the project and 25% of the implementation of the project are to be completed in the seventh semester .An Evaluation Committee consisting of the guide , Project co-ordinator and three faculty members of the department and HOD will perform the assessment of the projects. Members of the group will present / demonstrate the project details and progress of the project before the committee at the end of the seventh semester. An interim report is to be submitted.

Internal work assessment

1	Technical relevance *of* project, literature Survey and preliminary works	10 Marks
2	Progress of the project	15 Marks
3	Regularity and Participation	5 Marks
4	Presentation /demonstration before committee Interiam report	15 Marks 5 marks'
	TOTAL	50 Marks

EIGHTH SEMESTER

EC04 - 801: MICROELECTRONIC TECHNOLOGY

3 hours lecture and 1 hour tutorial per week

Objectives: To introduce the students about the various steps in the IC fabrication process starting from raw silicon. With this paper, students should be aware of the physical principles of IC technology process.

Module I (13 hours)
Wafer processing - diffusion - Fick's law - analytic solutions for predeposition and drive-in diffusion - oxidation - deal-grove model - ion implantation - vertical and lateral projected ranges - channeling - stopping power - optical lithography –optical exposures - modulation transfer function - proximity and projection printing - photoresists - types - contrast curves - etching - wet, plasma and ion etching - epitaxial growth - MOCVD and molecular beam epitaxy

Module II (13 hours)
Device isolation - contacts and metallization - junction and oxide isolation - LOCOS - SILO - SWAMI process - trench isolation - silicon on insulator isolation - schottky contacts - implanted ohmic contacts - alloyed contacts – refractory metal contact technology - multi level metallization.

Module III (13 hours)
CMOS and bipolar technologies - early bipolar process - advanced bipolar processes - CMOS process - p well process - twin tub process - hot carrier effects in **BJT** and CMOS - BiCMOS fabrication process sequence

Module IV (13 hours)
VLSI design fundamentals - layout and design rules for well, pads, metal layers, poly 1, poly 2 - layout using cell hierarchy - layout of MOSFET - layout of the inverter - NOR and NAND gates - layout of junction isolated BJT

Text books
1. Campbell S.A., *The Science & Engineering of Microelectronic Fabrication,* Oxford University Press
2. Nagchowdhari D., *Principles of Microelectronics Technology,* Wheeler Publishing
3. Pucknell D.A. & Kamran Eshragian, *'Basic VLSI Design',* PHI

Reference books
1. Sze S.M., ' *VLSI Technology',* MGH
2. Chang C.Y. & Sze S.M.,' *VLSI Technology',* MGH
3. Ruska W.S., *"Microelectronic Processing',* MGH
4. Backmann K.J., *'The Material Science of Microelectronics',* VCH Publishers
5. Jacob Baker R., Li H.W. & Boyce D.E.,' *CMOS - Circuit Design, Layout & Simulation',* PHI

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks -50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 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 Il with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 - 802: WIRELESS MOBILE COMMUNICATION

3 hours lecture and 1 hour tutorial per week

Objectives:

This paper is to provide a strong background in imparting knowledge about the existing GSM and CDMA mobile communication technology.

Module I (12 hours)

Mobile radio propagation - free space propagation model - ground reflection model - large scale path loss - small scale fading and multipath propagation -impulse response model of a multipath channel - parameters of a mobile multipath channel - multipath delay spread - doppler spread - coherence band width -coherence time - time dispersion and frequency selective fading - frequency dispersion and time selective fading - concepts of level crossing rate and average fade duration

Module II (14 hours)

Digital communication through fading multipath channels - frequency non selective, slowly fading channels - frequency selective, slowly fading channels-calculation of error probabilities - tapped delay line model - the RAKE demodulator performance - diversity techniques for mobile wireless radio systems concept of diversity branch and signal paths - combining methods - selective diversity combining - pre-detection and post detection combining -switched combining - maximal ratio combining- equal gain combining

Module III (12 hours)

Cellular concept - frequency reuse - cochannel interference - adjacent channel interference - power control for reducing interference - improving capacity in cellular systems - cell splitting - sectoring - hand off strategies - channel assignment strategies - call blocking in cellular networks

Module IV (14 hours)

Fundamental concepts of spread spectrum systems - pseudo noise sequence -performance of direct sequence spread spectrum systems - analysis of direct sequence spread spectrum systems - the processing gain and anti jamming margin - frequency hopped spread spectrum systems - time hopped spread spectrum systems - synchronization of spread spectrum systems

Text books

1. Kamilo Feher,' *Wireless Digital Communications',* PHI
2. *Rapport T.S., Wireless Communications,Principles and Practice',* Prentice Hall
3. Lee W.C.Y., *'Mobile Cellular Telecommunication',* MGH
4. Proakis J.G., *'Digital Communications',* MGH

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 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.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 803: COMMUNICATION SWITCHING SYSTEMS

3 hours lecture and 1 hour Tutorial per week

Objectives:
With this paper students should be able to analyze the characteristics of a typical digital switching network.

Module I (13 hours)
Electronic switching systems: basics of a switching system - electronic space division switching - stored program control - time division switching - time multiplexed space switching - time multiplexed time switching - two-stage network - three-stage network - n-stage network- two stage, three stage and N-stage combination switching-

Module II (13 hours)
Digital circuit switching networks: Non-blocking switches - blocking probability analysis of multistage switches - lee approximation - improved approximate analysis of blocking switch - examples of digital switching systems - AT & T 5ESS and NTI - DMS 100 switching systems.

Module III (13 hours)
Elements of traffic engineering: network traffic load and parameters - grade of service and blocking probability - incoming traffic and service time characterization - blocking models and loss estimates - delay systems

Module IV (13 hours)
Signaling: customer line signaling - outband signaling - inband signaling - PCM signaling - inter register signaling - common channel signaling principles - CCITT signaling system No: 7 - digital customer line signaling
Introduction to ATM switching - Strict sense non block switch - self routing switches - Bense network-ATM routers - Design of typical switches.

Text books
1. Viswanathan T., *Telecommunication Switching Systems and Networks,* Prentice Hal! of India Pvt. Ltd.
2. Schwartz M., *Telecommunication Networks - Protocols, Modeling and Analysis,* Addison Wesley Publishing Company

Reference books
1. Flood J.E., *Telecommunications Switching Traffic and Networks,* Pearson Education Pvt. Ltd.
2. Freeman R.L., *Telecommunication System Engineering,* Wiley Inter Science Publications
3. Das J., *Review of Digital Communication,* New Age Internal (P) Ltd., Publishers

Internal work assessment
60% - Test Papers (Minimum 2)
30% -Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module l with choice to answer anyone.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 804(A): DSP CONTROLLERS

(Common withAI04 804A,BmO4 804AJC 04 804A)

3 hours lecture and 1 hour tutorial per week

Objectives: This paper introduces the student with the knowledge about the architecture, interfacing and programming with TMS320C6X. Students should be able to design and develop TMS320C6X based system(both hardware and software) for a particular DSP application.

Module-1

Architecture of TMS 320C6x-functional units-fetch and execute-pipelining-registers-addressing modes-instruction sets-timers-interrupts-serial ports-DMA-memory

Module-2

Fixed and floating point formats-code improvement-constraints-TMS 320C64x CPU-simple programming examples using C/assembly.

Module-3

Review of FIR, IIR filters-DFT and FFT. Adaptive filters-examples for noise cancellation and system examples-code optimization-procedure-software pipelining

Module 4

Typical DSP development systems-support tools and files-compilers-assemblers-code compressor studio-codecs-DSP application examples in codec, voice scrambling, PLL, AI, image processing, FSK modems, voice detection and reverse playback, multi rate filters, PID controllers.

Text Books

Rulph Chassaing DSP applications using C and the TMS 320C6x DSK, Wiley 2002

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.(One assignment may be a practical DSP implementation with TMS320C6X).
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module l with choice to answer anyone.
QIII- 2 questions A and B of 15 marks from module II with choice to answer any one.
QIV - 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one

EC04 - 804(B): INDUSTRIAL PSYCHOLOGY

3 hours lecture and 1 hour tutorial per week

Objective:
To give General awareness on the Human and Industrial Phsycology

Module I (13 hours)
Introduction - psychology as a science - areas of applications - study of individual - individual differences - study of behavior - stimulus - response behavior - heredity and environment - human mind - cognition - character -thinking - attention - memory- emotion - traits - attitude - personality

Module II (13 hours)
Organizational behavior -definition - development - fundamental concept -nature of people - nature of organization - an organizational behavior system -models - autocratic model - hybrid model - understanding a social - system social culture - managing communication - downward, upward and other forms of communication

Module III (13 **hours)**
Motivation - motivation driver - human needs - behavior modification - goal setting - expectancy model - comparison models - interpreting motivational models - leadership - path goal model - style - contingency approach

Module IV (13 hours)
Special topics in industrial psychology - managing group in organization -group and inter group dynamics -managing change and organizational development - nature planned change - resistance - characteristic of OD - OD process.

Reference books

1. Davis K. & Newstrom J.W., *"Human Behavior At Work"*, McGraw Hill International
2. Schermerhorn J.R. Jr., Hunt J.G & OsbornR.N., *"Managing Organizational Behavior"*, John Willy
3. Luthans, *"Organizational Behavior"*, McGraw Hill, International
4. Morgan C.T., King R.A., John Rweisz & John Schoples, *"Introduction to Psychology"*, McGraw Hill
5. Blum M.L. & Naylor J.C., Horper & Row, *"Industrial Psychology"*, CBS Publisher

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
Q l - 8 Short type questions of 5 marks, 2 from each module.
QII - 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.
QIV- 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV- 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 804(C): ANALOG MOS CIRCUITS

3 hours lecture and 1 hour tutorial per week

Objectives:
This paper enables the student to have ideas about chip level analysis and modeling of MOS transistor amplifier circuits. This knowledge will be useful in mixed signal circuit design.

Module I (**11 hours)**
Analog MOS models - low frequency model - MOS in saturation - high frequency model - variation of transconductance with frequency - temperature effects in MOST - noise in MOST (shot, flicker and thermal noise) - MOS resistors and resistor circuits - super MOST

Module II (14 hours)
Current sources and sinks - current mirror - cascode current source - transient response of simple current mirror - Wilson current mirror - regulated cascode current source/sink - voltage references - resistor MOSFET and MOSFET only voltage references - band gap references - various biasing schemes for voltage references

Module III (**12 hours)**
Common source - common gate and source follower amplifiers - class AB amplifier - active load configuration - transimpedance amplifier - cascode amplifier - push pull amplifier - amplifier based signal processing - the differential difference amplifier (DDA) - adder, multiplier, divider and filters using DDA

Module IV (15 hours)
Mixed signal circuits - CMOS comparator design - pre amplification - decision and post amplification stages - transient response - clocked comparators -analog multiplier - the multiplying quad - level shifting in multipliers - dynamic analog circuits - charge injection and capacitive feed through in MOS switch -sample and hold circuits -switched capacitor filters - switched capacitor implementation of ladder filters.

Reference books
1. Jacob Baker R., LiH.W.&BoyceD.E., *'CMOS- Circuit Design, Layout & Simulation',* PHI
2. Mohammed Ismail & Terri Fiez, *Analog VLSI - Signal & Information Processing,* MGH
3. Roubik Gregorian & Gabor C Temes, *Analog MOS Integrated Circuits for Signal Processing,* John Wiley.

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
Q l - 8 Short type questions of 5 marks, 2 from each module.
QII - 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.
QIV- 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV- 2 questions A and B of 15 marks from module IV with choice to answer anyone.

EC04 - 804(D): DIGITAL SYSTEM DESIGN

3 hours lecture and 1 hour tutorial per week

Objectives:

With this paper, the students should be able to design, simulate and implement a typical sequential digital system in FPGA/CPLD and propose proper testing strategy.

Module I (12 hours)

Review of logic design: logic design issues - hazards in combinational **networks** -hazards in sequential networks - synchronous design method - clock skew - asynchronous inputs - synchroniser failure and metastability

Module II (14 hours)

Hardware description languages: introduction to VHDL - behavioral modeling - transport Vs inertia! delay - simulation deltas - sequential processing – process statement - signal assignment Vs variable assignment - sequential statements - data types - subprograms and packages - predefined attributes – configurations - subprogram overloading - VHDL synthesis – design examples

Module III (13 hours)

Designing with programmable devices: programmable LSI techniques -programmable logic arrays- programmable array logic - sequential PLDs -sequential circuit design using PLDs - complex programmable logic devices and filed programmable gate arrays - altera series FPGAs and Xilinx series FPGAs (typical internal structure)

Module IV (13 hours)

Design issues for testability: design for testability - bed of nails and in-circuit testing - scan methods - testing combinational circuits - testing sequential circuits - boundary scan - built-in self test - estimating system reliability -transmission line reflections and termination

Text books

1. Roth C.H. Jr., *"Digital System Design Using VHDL"*, PWS Pub. Co.
2. Wakerly J.F., *"Digital Design: Principles and Practices "*, PHI Inc.
3. Katz R.H., *"Contemporary Logic Design "*, Benjarnin/Cummings Publishing Co.
4. Bostock G, *"FPGAs and Programmable LSF*, Butterworth Heinemann
5. Perry D.L.," *VHDL "*, McGraw Hill

Reference books

1. Lewin D. & Protheroe D., *"Design of Logic Systems"*, Chapman & Hall
2. Zoran Salacic, *"Digital System Design and Prototyping Using Field Programmable Logic"*, Kluwer Academic Publishers
3. Stephen Brown & Zvonoko Vranesic, *"Fundamentals of Digital Logic with VHDL Design"*, McGraw Hill
4. Bhasker 1, *"A VHDL Primer"*, Addison Wesley
5. Navabi Z., *"VHDL: Analysis and Modeling of Digital Systems"*, McGraw Hill
6. Palnikkar, *Verilog HDC*, Pearson Education

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
(One of the assignments may be the VHDL simulation of a typical digital system)
10% - Other measures like regularity and participation in class.
Total marks =50. .

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 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.
QIV - 2 questions A and B of I5 marks from module III with choice to answer anyone.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 804(E): BIOMEDICAL INSTRUMENTATION

3 hours lecture and 1 hour tutorial per week

Objectives:

To impart knowledge about the principle and working of different types of bio- medical electronic equipment/devices.

Module I (13 hours)

Electrical activity of excitable cells - SD curve - functional organization of the peripheral nervous system - electrocardiogram (in detail with all lead systems) - electroencephalogram - electro my ogram - electroneurogram - electrode - electrolyte interface - polarisation - polarisable and non polarisable electrodes - surface electrodes - needle electrodes - micro electrodes - practical hints for using electrodes - 'skin-electrode' equivalent circuit-characteristics of 'bio - amplifiers'.

Module II (13 hours)

Blood pressure - direct measurements - harmonic analysis of blood pressure waveform - systems **for** measuring venous pressure - heart sounds -phonocardiography - cardiac catheterisation - indirect blood pressure measurement - electromagnetic blood flow meters - ultrasonic blood flow meters -impedance plethysmography - photo plethysmography - 'indicator-dilution' method for blood flow determination - spirometry - measurement of various respiratory parameters - respiratory plethysmography - chamber plethysmography

Module III (13 hours)

Measurement of gas flow rate - cardiac pacemakers and other electric stimulators - defbrillators and cardio converters - blood pumps - hemodialysis – ventilators - infant incubators - drug delivery devices - lithotripsy - therapeutic applications of laser.

Module IV (13 hours)

Physiological effects of electricity - important susceptibility parameters - macro shock hazards - micro shock hazards - protection against shock - electrical isolation - electrical safety analyzers - measurement of pH, pCO_2 and $PO_;$

Text books

1. Webster J., *Medical Instrumentation - Application and Design,* John Wiley
2. *Hand Book of Biomedical Instrumentation,* TMH

Reference books

1. Geddes & Baker, *Principles of 'Applied Biomedical Instrumentation, Wiley*
2. *Encyclopedia of Medical Devices and Instrumentation* Wiley
3. Bronzino, *Hand book of Biomedical Engineering,* IEEE Press book

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module I with choice to answer any one.
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one.
QIV - 2 questions A and B of l5 marks from module III with choice to answer any one.
QV - 2 questions A and B of l5 marks from module IV with choice to answer any one.

EC04 - 804(F): MULTIMEDIA COMMUNICATION SYSTEMS

3 hours lecture and 1 hour tutorial per week

Objectives:

After studying this paper, the student is expected to have a thorough knowledge in audio/video standards and different types of multimedia networks and technology.

Module-1

Multimedia Communication Model- Elements of Multimedia Systems- User Requirements- Network Requirements- Packet Transfer Concept- Multimedia Requirements and ATM Networks. Multimedia Terminals. Media Interaction. Bimodality of Human Speech. Lip Reading. Speech-Driven Talking Heads. Lip Synchronization. Lip Tracking. Audio-to-Visual Mapping. Bimodal Person "Verification. Joint Audio-Video Coding.

Module - 2

Digital Media. Signal-Processing Elements. Texture-Based Methods. Shape-Based Methods. Color-Based Methods. Perceptual Coding of Digital Audio Signals. Absolute Threshold of Hearing. Critical Band Frequency Analysis. Simultaneous Masking and the Spread of Masking. Temporal Masking. PE. Transform Audio Coders. Audio Subband Coders. Speech Coder Attributes. CD Audio Coding for Multimedia Applications. Image Coding. Video Coding. Watermarking. Organization, Storage and Retrieval Issues. Signal Processing for Networked Multimedia.

Module - 3

Speech coding standards-Audio coding standards-Still image compression standards-Multimedia conferencing standards. MPEG-1 and -2 compression-
MPEG- 4 and -7

ModuIe - 4

Main Features of a Distributed Multimedia Systems (DMS) Resource Management of DMS. Multimedia Operating VoD. Telecooperaiion Infrastructure. Telemedicine. Basic Features of a Hypermedia System. packet Audio/Video in the Network Environment.. Multimedia Transport Across **ATM** Networks. Multimedia Across IP Networks. Multimedia Across DSLs. Serial Transmission: TDM. Parallel Transmission Frequency Division Multiplexing Internet Access Networks. Multimedia Across Wireless. Communication System (WBCS) for Multimedia.. Multicast Routing in Cellular Networks. Broadband Wireless Mobile. Digital Video Broadcasting (DVB).

Text Book:

1. K.R.Rao, *Multimedia Communication Systems, Technology, **Standard** and Networks,* Pearson Education.

References:

1. Gibson. J.D, *Multimedia Communications, Directions and Innovations,* Academic Press
2. Ralf Steinmetz, *Multimedia Fundamentals,* Pearson Education

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the-teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

Q1 - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module I with choice to answer anyone.
QIII- 2 questions A and B of 15 marks from module II with choice to answer anyone.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 805(A): SOFT COMPUTING TECHNIQUES

(Common with AI04 805A, BM 04 8O5A, IC 04 805A)

3 hours lecture and 1 hour tutorial per week

Objectives:

To acquaint the students with important soft computing methodologies-neural networks, fuzzy Iogic, genetic algorithms and genetic programming.

Module I (13 hours)

Artificial intelligence systems- Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks: Biological neural networks, model of an artificial neuron, Activation functions, architectures, characteristics-learning methods, brief history of ANN research-Early ANN architectures (brief srudy)-McCulloch & Pitts model, Perceptron, AD ALINE, MADALINE

Module II (13 hours)

Backpropagation networks: architecture, multilayer perceptron, back propagation learning-input layer, hidden layer, output layer computations, calculation of error, training of ANN, BP algorithm, momentum and learning rate, Selection of various parameters in BP networks.
Variations in standard BP algorithms- Adaptive learning rate BP, resilient BP, Levenberg-Marquardt, and conjugate gradient BP algorithms (basic principle only)-Applications of ANN

Module III (13 hours)

Fuzzy Logic-Crisp & fuzzy sets - fuzzy relations - fuzzy conditional statements - fuzzy rules - fuzzy algorithm. Fuzzy logic controller - fuzzification interface -knowledge base - decision making logic - defuzzification interface - design of fuzzy logic controller - case studies.

Module IV (13 hours)

Genetic algorithms - basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Elitism. Inheritance operators, Crossover-different types, Mutation, Bit-wise operators, Generational cycle, Convergence of GA, Applications of GA - case studies. Introduction to genetic programming-concepts.

Text Books

1. R. Rajasekaran and G. A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications*, Prentice Hall of India, New Delhi, 2003.
2. M. T. Hagan, H. B. Demuth, and M.H. Beale, *Neural Network Design* PWS Publishing, Boston, MA, 1996.
3. L. Fausett, *Fundamentals of Neural Networks*, Prentice Hall, Upper Saddle River, N.J, 1994.

Reference Books

Yagnanarayana
Driankov D., Hellendron. H. Reinfrank M., An Introduction to Fuzzy control, Narosa publishing House, New Delhi, 1996.

Note: One assignment must be compulsorily based on simulation of artificial neural network, fuzzy logic systems, and genetic algorithm using computing software such as MATLAB. Another assignment may be solution of a practical problem using any of the soft computing techniques.

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks =50.

University examination Pattern

Q1 - 8 Short type questions of 5rnarks, 2 from each module.
QII - 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.
QIV - 2 questions A and B of l5 marks from module III with choice to answer any one.
QV- 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 805(B): SPEECH PROCESSING

3 hours lecture l hour tutorial per week

Objectives:

After studying this paper the student is expected to know about efficient algorithms/techniques for speech coding/compression, synthesis and recognition.

Module I (13 hours)

Digital models for the speech signal - mechanism of speech production - acoustic theory - lossless tube models - digital models - linear predictive coding of speech - auto correlation - formulation of LPC equation - solution of LPC equations - Levinson Durbin algorithm - Leyinson recursion - Schur algorithm - lattice formulations and solutions - PARCOR coefficients

Module ll (13 hours)

Spectral analysis of speech - short time fourier analysis - filter bank design -speech coding - subband coding of speech - transform coding - channel vocoder - formant vocoder - cepstral vocoder - vector quantizer coder

Module III (13 hours)

Speech synthesis - pitch extraction algorithms - Gold Rabiner pitch trackers -autocorrelation pitch trackers - voice/unvoiced detection - homomorphic speech processing - homomorphic systems for convolution - complex cepstnims - pitch extraction using homomorphic speech processing

Module IV (13 hours)

Automatic speech recognition systems - isolated word recognition - connected word recognition - large vocabulary word recognition systems - pattern classification - DTW, HMM - speaker recognition systems - speaker verification systems - speaker identification systems.

Text books

1. Rabiner L.R. & Schafer R. W., *"Digital Processing of Speech Signals"*, Prentice Hall Inc.
2 **Thomas** Parsons, " *Voice and Speech Processing"*, McGraw Hill Series
3. Saito S. & Nakata K., *'"Fundamentals of Speech Signal Processing",* Academic Press, Inc.

Reference books

1. Owens F.J., *"Signal Processing of Speech"*, Macmillan New Electronics
2. *Pa*pamichalis P.E., *"Practical Approaches to Speech Coding"*, Texas instruments, Prentice Hall.
3. Rabiner L.R. & Gold, *"Theory and Applications of Digital Signal Processing"*, Prentice Hall of India.

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total Marks = 50.

University Examination Pattern

Q l - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 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 anyone.
Q1V-2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one

EC04 805(C): ENTREPRENEURSHIP

3 hours lecture and I hour tutorial per week

Objective:
To give idea on Entrepreneur perspectives.

Module I (13 hours)
Entrepreneurial perspectives - understanding of entrepreneurship process - decision process - entrepreneurship and economic development - characteristics of entrepreneur - entrepreneurial competencies – managerial functions for enterprise

Module II (13 hours)
Process of business opportunity identification and evaluation - industrial policy -environment - market survey and market assessment - project report preparation study of feasibility and viability of a project - assessment of risk in the industry.

Module in (13 hours)
Process and strategies for starting a venture - stages of small business growth - entrepreneur-ship in international environment - entrepreneurship – achievement motivation - time management creativity and innovation structure of the enterprise - planning, implementation and growth

Module IV (13 hours)
Technology acquisition for small units - formalities to be completed for setting up a small scale unit - forms of organizations for small scale units - financing of project and working capital - venture capital and other equity assistance available - break even analysis and economic ratios technology transfer and business incubation

Reference books

1. Harold Koontz & Heinz Weihrich, *Essentials of Management,* McGraw Hill International
2. Hirich R.D. & Peters Irwin MR, *Entrepreneurship,* McGraw Hill
3. Rao T.V. & Deshpande M. V., Prayag Metha & Nadakami M.S., *Developing Entrepreneurship A Hand Book,* Learning Systems
4. Donald Kurado & Hodgelts R.M., *Entrepreneurship A Contemporary Approach,* The Dryden Press
5. Dr Patel V.G., *Seven Business Crisis,* Tata McGraw Hill
6. Timmons J.A., *New Venture Creation - Entrepreneurship for 21s' Century,* McGraw Hill International
7. Patel J.B., Noid S.S., *A Manual on Business Opportunity Identification, Selections,* EDII
8. Rao C.R., *Finance for Small Scale Industries*
9. Pandey G.W., *A Complete Guide to Successful Entrepreneurship,* Vikas Publishing

Internal work assessment
60% - Test Papers (Minimum 2)
30% -Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of l5 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.
QIV-2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one**.**

EC04 - 805(D): TELEVISION ENGINEERING AND RADAR SYSTEMS

3 hours lecture and 1 hour tutorial per week

Objectives:

After studying this paper, students are expected to understand the principles of different types of CTV and radar(both transmitter and receiver)and then-uses. They should be aware of the existing standards.

Module I (13 hours)

Principles of television - image continuity - interlaced scanning - picture resolution-blanking - synchronizing - video and sound signal modulation -channel bandwidth - positive and negative modulation-vestigial sideband transmission - transmission efficiency- VSB signal reception - transmitter and receiver block diagrams - CCD camera

Module II (13 hours)

Colour TV - Colour perception - luminance, hue and saturation - colour TV camera and picture tube - colour signal transmission - bandwidth - modulation - formation of chrominance signal - principles of NTSC, PAL and SECAM coder and decoder

Module III (13 hours)

Digital TV - composite digital standards -$4f_a$ NTSC standard - general specifications - sampling structure - general concept of video bit reduction -MPEG standard - digital transmission - cable TV - cable frequencies - co-axial cable for CATV - cable distribution system - cable decoders - wave traps and scrambling methods

Module IV (13 hours)

Radar systems - radar frequencies - radar equation - radar transmitter and receiver (block diagram approach) - continuous wave radar - frequency modulated CW radar - moving target indicator radar - tracking radar

Text books

1. Gulati R.R., *Modern Television Engineering,* Wiley Eastern Ltd.
2. Michael Robin & Michael Poulin, *Digital Television Fundamentals,* McGraw Hill.
3. Bernard Grob & Charles E. Hemdon, *Basic Television and Video Systems,* McGrawHill Internationa
4. *Introduction to Radar Systems,* McGraw Hill, Kogakusha Ltd.

Reference books

1. DhakeA.M., *Television Engineering,* Tata McGraw Hill
2. Damacher P., *Digital Broadcasting,* lEE Telecommunications Series

Internal work assessment

60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks - 50.

University examination Pattern

QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module I with choice to answer any one
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer any one.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 805(E): NANO TECHNOLOGY

3 hours lecture and 1 hour tutorial per week

Objectives: This is an introductory paper to the subject of nanotechnology. After studying this subject, the student should have a basic knowledge about nano/microdevices, mathematical modeling of electromechanical systems and applications.

Module - 1 (13 Hours)
Biological analogies of Nano and Micro-electromechanical systems (NMEMS) - Fabrication of MEMS- assembling and packaging- applications of NMEMS.

Module - 2 (13 Hours)
Mathematical models and design of NMEMS-NMEMS architecture-electro magnetics and its applications in NMEMS- Molecular and Nano structure dynamics-molecular wires and molecular circuits- thermo analysis and heat equation

Module – 3 (13 Hours)
Carbon nanotubes and nano devices-structural design of nano and MEM actuators and sensors-configurations and structural design of motion nano-and micro- structures.

Module - 4 (13 Hours)
Algebra of sets-direct current micro machines-mathematical models of induction motors-micro synchronous machines-single phase reluctance motors -stepper motors-synchronous reference frames- control of NMEMS

Text Book:
Lyschevski, Sergey Edward, *Nano and Microelectromechanical systems: Fundamentals of Nano and micro engineering*, CRC Press, 2000.

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern
QI - 8 Short type questions of 5 marks, 2 from each module.
QII- 2 questions A and B of 15 marks from module I with choice to answer any one.
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one.
QIV - 2 questions A and B of l5 marks from module III with choice to answer any one
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 805(F): INTERNET TECHNOLOGY

3 hours lecture and 1 hour tutorial per week

Objectives:
To make the student aware of the various protocols used in internet.

Module I (13 hours)
Computer networks and the internet - principles of application-layer protocols - HTTP - FTP - e-mail - DNS - socket programming with TCP/UDP - web servers - web pages design using HTML and XML

Module II (13 hours)
Multimedia networking - applications - streaming stored audio and video -internet telephony - RTP - scheduling and policing mechanisms - integrated services - RSVP - differentiated services - *network management* - the internet network management framework

Module III (13 hours)
Network security - *E-mail security* - privacy - S/MIME - *IP security* – overview -architecture - authentication - header and payload - combining security associations - key management - *web security* - SSL and transport layer security - SET - *system security* - intruders and viruses - *firewalls* - design – trusted systems.

Module IV (13 hours)
Mobile internet - *mobile network layer* - mobile IP - dynamic host configuration protocol -ad hoc networks - *mobile transport layer* - implications of TCP on mobility - indirect TCP - snooping TCP - mobile TCP - transmission - selective retransmission - transaction-oriented TCP - *support for mobility* - file systems - WAP protocols - WML - WML script- wireless telephony applications

Text books

1. Kurose J.F. & Ross K.W., *Computer Networking: A Top-Down Approach Featuring the Internet*, Addison Wesley, Modules I & II.
2. Stallings W., *Cryptography and Network Security Principles and practice,* Pearson Education Asia, Module III.
3. Schiller J., *Mobile Communications,* Addison Wesley, Module IV

Reference books

1. Deitel H.M., Deitel P. J. & Nieto T.R., *Internet And World Wide Web: How to Program,* Pearson Education
2. Greenlaw R & Hepp E, *In-line / On-line: Fundamentals Of The Internet And The World Wide Web*, Tata McGraw Hill.
3. Sharma V. & Sharma R, *Developing e-Commerce Sites: An Integrated Approach,* Addison Wesley.
4. Singhal et. al S., *The Wireless Application Protocol,* Pearson Education Asia
5. Goncalves M., *Firewalls: A Complete Guide,* Tata McGraw Hill.

Internal work assessment
60% - Test Papers (Minimum 2)
30% - Assignments/Term Project/ any other mode decided by the teacher.
10% - Other measures like regularity and participation in class.
Total marks = 50.

University examination Pattern

QI - 8 Short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks from module I with choice to answer any one.
QIII- 2 questions A and B of l5 marks from module II with choice to answer any one.
QIV- 2 questions A and B of 15 marks from module III with choice to answer anyone.
QV - 2 questions A and B of 15 marks from module IV with choice to answer any one.

EC04 - 806(F): ADVANCED COMMUNICATION ENGINEERING LAB

3 hours lecture and 1 hour tutorial per week

Objective:

To make the students familiar with microwave devices ,MATLAB ,DSP kits, PSPICE

Microwave and optical experiments

1. Klystron characteristics o/p power & frequency versus repeller voltage
2. Slotted line measurements. VSWR & Impedance
3. Antenna radiation pattern measurements
4. Directional coupler and isolator
5. Optical fibre experiments. Analog & digital

Experiments using matlab/ DSP kit

6. IIR filter-low pass & high pass
7. FIR filter-low pass &high pass
8. MMSE Equalizer implementations

Experiments using Hardware/VHDL/Pspice

9. PN code generator
10. Cyclic encoder and decoder
11. Digital TDM circuit
12. Spreader and de-spreader circuits

Internal work assessment

60%-Laboratory practical and record
30%- Test/s
10%- Other measures like regularity and participation in class
Total Marks = 50

EC04 - 807(P): PROJECT WORK

7 hours project work per week

Objective:

To develop an ability in an Engineering student to convert his/her theoretical knowledge into practical systems and also to assess his **inherent capabilities and talents in the above task.**

This project work is the continuation of the 7lh semester project - The student should complete the project work in this semester and present it before the Evaluation Committee - The Evaluation Committee as constituted in the 7th semester will assess the various projects, fix the relative grading and group average marks - The guide will award the marks for the individual student in a project, maintaining the group average.

Internal work Assessment

Design and Development	:	40 marks
Regularity and participation	:	10 marks
Presentation and Demonstration	:	30 marks
Report	:	20 marks
Total	:	100 marks

EC04 - 808(P): VIVA VOCE

Objective:

To examine the knowledge acquired by the students during B. Tech course through an oral examination.

There is only university examination for this - Examiners will be appointed by the university for conducting the viva voce - The viva voce exam will be based on the subjects studied for the B. Tech. course, mini project, project and seminar reports of the student. Each student has to submit the certified reports of Mini Project, Seminar and project (Interim & Main report) before the Examiners.

Internal work Assessment

Subject	:	50 marks
Mini Project	:	10 marks
Seminar	:	10 marks
Project	:	30 marks
Total	:	100 marks

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