P.D.M. COLLEGE OF ENGINEERING

Sarai Aurangabad

SYLLABUS

Bachelor of Engineering

INSTRUMENTATION & CONTROL ENGINEERING

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES & EXAMINATION

B.E II YEAR (ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING) SEMESTER – III

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
HUM-201-E	ECONOMICS (COMMON FOR ALL BRANCHES)	3	1	-	4	50	100	-	150	3
MATH-201-E	MATHEMATICS - III (COMMON FOR ALL BRANCHES)	3	2	-	5	50	100	-	150	3
EE-201-E	ELECTRICAL ENGINEERING MATERIALS & SEMICONDUCTOR DEVICES (EL,ELI&C,EE	3	1	-	4	50	100	-	150	3
EE-203-E	NETWORK THEORY (EL,ELI&C,EE	3	1	-	4	50	100	-	150	3
EE-205-E	ELECTROMECHANICAL ENERGY CONVERSION (EL,ELI&C,EE	3	1	-	4	50	100	-	150	3
ME-209-E	APPLIED MECHANICS	3	1	-	4	50	100	-	150	3
EE-221-E	ELECTRICAL ENGINEERING MATERIALS & SEMICONDUCTOR DEVICES LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
EE-223-E	NETWORK THEORY LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
EE-225-E	ELECTROMECHANICAL ENERGY CONVERSION LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
EE-231-E	ELECTRICAL WORKSHOP (EL,ELI&C,EE	-	-	3	3	50	-	50	100	3
	TOTAL	18	7	9	34	425	600	125	1150	

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B.E II YEAR (ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING) SEMESTER – IV

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
HUM-202-E	FUNDMENTALS OF MANAGEMENT	3	1	-	4	50	100	-	150	3
MATH-202-E	NUMERICAL METHODS	3	1	-	4	50	100	-	150	3
EE-202-E	ANALOG ELECTRONICS (EL,ELI&C,EE	3	1	-	4	50	100	-	150	3
EE-204-E	DIGITAL ELECTRONICS (EL,ELI&C,EE	3	1	-	4	50	100	-	150	3
EE-208-E	ELECTROMAGNETIC THEORY (EL,ELI&C	3	1	-	4	50	100	-	150	3
EE-210-E	ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS (ELI&C	3	1	-	4	50	100	-	150	3
EE-222-E	ANALOG ELECTRONICS LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
EE-224-E	DIGITAL ELECTRONICS LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
EE-230-E	ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS LAB (ELI&C	-	-	2	2	25	-	25	50	3
MATH-204-E	NUMERICAL METHODS LAB	-	-	2	2	25	-	25	50	3
GPIC-202-E	GENERAL PROFICIENCY	-	-	-	-	50	-	-	50	3
	TOTAL	18	6	8	32	450	600	100	1150	

NOTE : Practical Training of 6 weeks duration during summer vacation, Evaluation in V Sem.

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B.E III YEAR (ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING) SEMESTER –V

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
IC-301-E	TRANSDUCERS AND SIGNAL CONDITIONING	3	1	-	4	50	100	-	150	3
IC-303-E	LINEAR CONTROL SYSTEMS	3	1	-	4	50	100	-	150	3
CSE-210-E	COMPUTER ARCHITECTURE AND ORGANISATION	3	1	-	4	50	100	-	150	3
EE-303-E	ELECTRONIC MEASUREMENT AND INSTRUMENTATION (EL,ELI&C	3	1	-	4	50	100	-	150	3
EE-305-E	ANALOG ELECTRONIC CIRCUITS (EL,ELI&C	3	1	-	4	50	100	-	150	3
EE-309-E	MICROPROCESSORS AND INTERFACING (EL,ELI&C	3	1	-	4	50	100	-	150	3
EE-323-E	ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB (EL,ELI&C	-	-	2	2	25	-	25	50	3
EE-325-E	ANALOG ELECTRONIC CIRCUITS LAB (EL,ELI&C	-	-	2	2	25	-	25	50	3
EE-329-E	MICROPROCESSORS AND INTERFACING LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
1C-321-E	LINEAR CONTROL SYSTEM LAB	-	-	2	2	25		25	50	3
IC-333-E	PRACTICAL TRAINING-I	-	-	2	2	-	-	-	-	
	TOTAL	18	6	10	34	400	600	100	1100	

NOTE : 1. Assessment of Practical Training-I will be based on seminar, viva-voce, report and certificate for the practical training taken at the end of the Fourth Semester.

2. Students will be allowed to use the scientific calculator only, however sharing of calculator will not be permitted.

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B.E III YEAR (ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING) SEMESTER – VI

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
IC-405-E	COMPUTER BASED INSTRUMENTATION NAD CONTROL	3	1	-	4	50	100	-	150	3
IC-302-E	NON LINEAR CONTROL SYSTEM	3	1	-	4	50	100	-	150	3
IC-304-E	TELEMETRY, DATA PROCESSING & RECORDING	3	1	-	4	50	100	-	150	3
IC-306-E	BIOMEDICAL INSTRUMENTATION	3	1	-	4	50	100	-	150	3
EE-310-E	DIGITAL SYSTEM DESIGN (EL,ELI&C,EE,CSE	3	1	-	4	50	100	-	150	3
EE-317-E	POWER ELECTRONICS (COMMON WITH V-SEM. EE	3	1	-	4	50	100	-	150	3
IC-322-E	INSTRUMENTATION PROJECT LAB	-	-	2	2	25	-	25	50	3
EE-330-E	DIGITAL SYSTEM DESIGN LAB	-	-	2	2	25	-	25	50	3
EE-331-E	ELECTRONIC CIRCUIT SIMULATION LAB (COMMON WITH V-SEM EL	-	-	2	2	25	-	25	50	3
EE-321-E	POWER ELECTRONICS LAB (COMMON WITH V-SEM EE	-	-	2	2	25	-	25	50	3
GPIC-302-E	GENERAL PROFICIENCY	-	-	-	-	50	-	-	50	
	TOTAL	18	6	8	32	450	600	100	1150	

NOTE: 1. Practical Training –II of 6 weeks duration during summer vacation; Evaluation in VII Semester.
2. Students will be allowed to use the scientific calculator only, however sharing of calculator will not be permitted.

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B.E IV YEAR (ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING) SEMESTER – VII

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
IC-401-E	INDUSTRIAL PROCESS CONTROL	3	1	-	4	50	100	-	150	3
IC-403-E	EMBEDDED SYSTEM DESIGN	3	1	-	4	50	100	-	150	3
EE-407-E	DIGITAL SIGNAL PROCESSING (EL,ELI&C,EE (COMMON WITH VI-SEM. IT	4	-	-	4	50	100	-	150	3
	ELECTIVE-I	4	-	-	4	50	100	-	150	3
	ELECTIVE-II	4	-	-	4	50	100	-	150	3
IC-421-E	INDUSTRIAL PROCESS CONTROL LAB	-	-	2	2	25	-	25	50	3
IC-423-E	INSTRUMENTATION LAB	-	-	2	2	25	-	25	50	3
EE-427-E	DIGITAL SIGNAL PROCESSING LAB (EL,ELI&C,EE	-	-	2	2	25	-	25	50	3
IC-431-E	PROJECT OR	-	-	4	4	50	-	-	50	3
IC-433-E	INDUSTRIAL PROJECT									
IC-435-E	PRACTICAL TRAINING-II	-	-	2	2	-	-	-	-	-
	TOTAL	18	2	12	32	375	500	75	950	

NOTE : 1. Project load will be 2 hours for project co-ordinator & 1 hour for other faculty members involved in the project.
2. Project Course will commence in seventh semester where the students will identify the project problems, complete the design/ procure the materials /start the fabrication/complete the survey etc. depending upon the nature of the problem. The project will be completed in VIIIth sem..and its examination will be held in VIII semester.
3. Assessment of practical training –II will be based on seminar, viva-voce, report and certificate for the practical training taken at the end of VI semester
4. Students will be allowed to use the scientific calculator only, however sharing of calculator will not be permitted

BACHELOR OF ENGINEERING (BIO-MEDICAL ENGIEERING)
SCHEME OF COURSE/ EXAMINATION

(8th SEMESTER)

Course No	Subject	Teaching Schedule				Marks of Class Work	Examination Schedule		Total Marks	Duration of Exam (in Hrs)
		L	T	P/D	Total		Theory	P/VV		
BME-402 E	Biomedical Ethics	3	1	0	4	50	100	-	150	3
	Elective – I	3	1	0	4	50	100	-	150	3
	Elective – II	3	1	0	4	50	100	-	150	3
BME-404 E	Independent Study Seminar	0	0	4	4	50	-	-	50	3
GPBME – 402 E	General Fitness for the Profession	0	0	0	0	50	-	100	150	3
BME-408 E	Project in Industry/ Research Lab/ Hospital	0	0	10	10	100	-	200	300	3
	Total	9	3	14	26	350	300	300	950	

Note: Students are allowed to use single memory, non-programmable scientific calculator during exam.

ELECTIVE SUBJECT:

S.No.	Course Code	Course Title
1.	BME – 452 E	Artificial Organs
2.	CSE-462 E	OOPS and C++
3.	BME-454 E	Artificial Neural Networks in Medicine
4.	CSE-464 E	Fuzzy Logic and its Applications
5.	BME- 456 E	Bioelectromagnetism
6.	HUM-462 E	Operations Management

(ELECTRONICS INSTRUMENTATION & CONTROL ENGG.)

ELECTIVE-I

HUM-451-E	Language Skills for Engineers
MATH-453-E	Statistical Modeling
CH-451-E	Environmental Sciences & Engg.
EE-403-E	Multimedia System
IC-451-E	Intelligent Instrumentation
IT-471-E	Management Information System
HUM-455-E	Entrepreneurship
MATH-451-E	Combinatorics & Graph Theory
PHY-451-E	Non-Conventional Energy & Conversion Technology

ELECTIVE-II

HUM-457-E	Organisational Behaviour & Human Resource Management
IC-453-E	Optimal Control Theory
CSE-303-E	Computer Graphics
HUM-453-E	Oral Communications Competence
MATH-455-E	Linear Algebra

ELECTIVE-III

MATH-402-E	Operation Research
HUM-452-E	Business Communication
PHY-452-E	Laser Technology
IC-458-E	Random Process in Control & Estimation
IC-460-E	Parameter Estimation & System Identification
IC-462-E	Adaptive Control
MATH-452-E	Statistical Quality Control
EE-406-E	Advanced Control System
EE-464-E	Principles of Communication Engg.

ELECTIVE-IV

CSE-202-E	Data Base Management System
EE-466-E	Utilization of Electrical Power & Traction
CSE-304-E	Intelligence System
IC-464-E	Dynamic Behaviour of Processes
IC-466-E	Computer Aided Design of Control System
ME-484-E	Robotics Engineering
HUM-456-E	Marketing Management
HUM-454-E	Indian English Writing
MATH-454-E	Advanced Mathematics
IC-456-E	Digital Control System

HUM-201-E **ECONOMICS**
(COMMON FOR ALL BRANCHES)

L	T	P		
3	1	-	Class Work	: 50 Marks
			Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam.	: 3 Hrs.

COURSE OBJECTIVE : The purpose of this course is to :

1. Acquaint the student in the basic economic concepts and their operational significance and
2 .Stimulate him to think systematically and objectively about contemporary economic problems.

UNIT-I

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

UNIT-II

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

UNIT-III

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

UNIT-IV

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT-V

Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and supply on prices.

UNIT-VI

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

Books Recommended :
TEXT BOOKS :

1. Principles of Economics : P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

REFERENCE BOOKS :

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)

2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy : Rudar Dutt & K.P.M. Sundhram

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

MATH-201-E **MATHEMATICS-III**
(COMMON FOR ALL BRANCHES)

L	T	P
3	2	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Part-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Part-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).

Part-C

Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

TEXT BOOKS :

1. Advanced Engg. Mathematics : F Kreyszig.
2. Higher Engg. Mathematics : B.S. Grewal.

REFERENCE BOOKS :

1. Advance Engg. Mathematics : R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics : Michael D. Greenberg.
3. Operation Research : H.A. Taha.
4. Probability and statistics for Engineers : Johnson. PHI.

Note: Examiner will set eight questions, taking two from Part-A, three from Part-B and three from Part-C. Students will be required to attempt five question taking atleast one from each part.

EE-201-E ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT 1 CONDUCTING MATERIALS:
Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, super conductivity, effect of magnetic field, conducting materials, applications.

UNIT 2 DIELECTRIC MATERIALS:
Behaviour of dielectric materials in static electric field, Dipole moments, Polarization, Dielectric constant, Polarizability, Susceptibility, mechanisms of polarization, behaviour in alternating field, dielectric loss, loss tangent, types of dielectric & insulating materials, electrostriction, Piezo-electricity, Applications.

UNIT 3 MAGNETIC MATERIALS:
Permeability, Magnetic susceptibility, magnetic moment, Magnetization, Dipole moment, types of magnetic materials, Magnetostriction, eddy current & hysteresis losses, applications.

UNIT 4 SEMICONDUCTORS:
Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction.

UNIT 5 CONSTRUCTION AND CHARACTERISTICS OF DEVICES:
Brief introduction to Planar Technology for device fabrication., metal -semiconductor junctions (ohmic and non-ohmic), breakdown mechanisms in p-n junction, zener diode, electrical and optical excitation in diodes, LED, solar cells and photo-detectors.

UNIT 6 BIPOLAR AND MOS DEVICES :
BJT, UJT, JFET, MOSFETS

UNIT 7 POWER DEVICES :
Thyristor, Diac, Triac, GTO, IGBT, VMOS

TEXT BOOKS:
1. Electrical Engineering Materials: A.J. Dekker; PHI.
2. Solid State Electronic Devices : StreetMan & Banerjee; Pearson.
3. Electronic Devices & Circuits: Millman & Halkias; MGH.

REFERENCE BOOKS:
1. Electrical Engineering Materials: S.P Seth & P.V Gupta; Dhanpat Rai.
2. Text Book of Power Electronics : H.C.Rai; Galgoitia Publications.
3 Electronic Devices & Circuit Theory : Boylestad & Nashelsky; Pearson.
4. Semiconductor devices : Jaspreet Singh; John Wiley.

NOTE : Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-203-E **NETWORK THEORY**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT I TRANSIENT RESPONSE :
Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using laplace transform.

UNIT 2 NETWORK FUNCTIONS :
Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions, Time domain behavior from the pole-zero plot.

UNIT 3 CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS :
Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT 4 TOPOLOGY :
Principles of network topology , graph matrices, network analysis using graph theory.

UNIT 5 TYPES OF FILTERS AND THEIR CHARACTERISTICS :
Filter fundamentals, high-pass, low-pass, band-pass, and band-reject Filters.

UNIT 6 NETWORK SYNTHESIS :
Positive real functions, synthesis of one port and two port networks, elementary ideas of Active networks.

TEXT BOOKS:

1. Network Analysis & Synthesis : Umesh Sinha; Satya Prakash Pub.
2. Network Analysis & Synthesis : F.F.Kuo; John Wiley & Sons Inc.

REFERENCE BOOKS:

1. Introduction to modern Network Synthesis : Van Valkenburg; John Wiley
2. Network Analysis: Van Valkenburg; PHI
3. Basic circuit theory:Dasoer Kuh; McGraw Hill.
4. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.
5. Circuit Analysis : G.K. Mithal; Khanna Publication.
6. Networks and Systems : D.Roy Choudhury; New Age International.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-205-E ELECTROMECHANICAL ENERGY CONVERSION

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT 1 MAGNETIC CIRCUITS AND INDUCTION:
Magnetic Circuits, Magnetic Materials and their properties, static and dynamic emfs and force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses.

UNIT 2 PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION:
Force and torque in magnetic field system, energy balance, energy and force in singly excited magnetic field system, concept of co-energy, forces and torques in system with permanent magnets, dynamic equation.

UNIT 3 TRANSFORMERS :
Basic theory, construction , operation at no-load and full-load, equivalent circuit, phasor diagram, O.C. and S.C. tests for parameters determination, efficiency and regulation, auto-transformer, introduction to three-phase transformer ; Current and Potential Transformers : Principle, construction, analysis and applications.

UNIT 4 DC MACHINES :
Basic theory of DC generator, brief idea of construction, emf equation, load characteristics, basic theory of DC motor, concept of back emf, torque and power equations, load characteristics, starting and speed control of DC motors, applications.

UNIT 5 INDUCTION MOTOR:
Basic theory, construction, Phasor diagram, Equivalent circuit, Torque equation, Load characteristics, starting and speed control of induction motor, Introduction to single phase Induction motor and its applications, Fractional H.P. Motors, Introduction to stepper, servo reluctance and universal motors.

UNIT 6 SYNCHRONOUS MACHINES:
Construction and basic theory of synchronous generator, emf equation, model of generator, Phasor diagram, Regulation, Basic theory of synchronous motor, v-curves, synchronous condenser, applications.

TEXT BOOK:
1. Electrical Machines: Nagarath and Kothari; TMH

REFERENCE BOOKS:
1. Electrical Machines :P.S. Bimbhra; Khanna
2. Electrical Machines: Mukherjee and Chakravorti; Dhanpat Rai & Sons
3. Electrical Technology (Vol-II) : B.L Theraja; S. Chand.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

ME-209-E **APPLIED MECHANICS**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT 1. BENDING AND SHEAR SRESSES IN BEAMS:
Review of centre of gravity of an area, moment of inertia of the sections, bending stress in beams with symmetrical] sections and subjected to pure bending, shear stresses in beams of symmetric sections, shear centre, Problems.

UNIT 2. TORSION OF CIRCULAR MEMBERS :
Torsion of tube, solid and hollow circular shafts, tapered shafts, stepped shaft & composite concentric shafts, combined bending & torsion, equivalent torque, effect of end thrust, Numericals.

UNIT 3. PLANE TRUSSES :
Review of equilibrium conditions, free body diagrams, types of trusses, reactions at supports of a truss, determination of axial forces in the members of truss by methods of joints & sections. Numericals.

UNIT 4. THEORIES OF FAILURE :
Concepts of various theories of elastic failure and governing equations with their graphical representation, applications, Numericals.

UNIT 5. GENERAL DESIGN CONSIDERATIONS:
Introduction , scope & meaning of design, design process, concept of tearing, wearing, shearing, crushing, bending etc., selection of materials, factor of safety, stress concentration factor, design stresses for variable & repeated loads, endurance limit, fatigue strength, fits & tolerances, Numericals.

UNIT 6. CABLES AND COLUMNS :
Derivations for cables subjected to concentrated loads and uniformly distributed load per unit horizontal distance separately and cable uniformly loaded per unit length along the cable itself, Derivation of Euler's Formula for crippling load of coloumn under different and conditions, Use of Rankin's Formula, Ecentic Loading of short columns of circular & rectangular cross-sections, Numericals.

UNIT 7. FLUID FLOW MECHANICS :
Review of fluid properties, flow regimes, types of flow, stream lines, path lines, streak lines, continuity equation, rotation, circulation, velocity potential, steam function, flow net, general energy equation for steady flow of any fluid, Bernoulli's equation with its applications & limitations, flow measuring devices, Numericals.

TEXT BOOKS :
1. Fluid Mechanics: A K Mohanty; Prentice Hall of India, N.D
2. Strength of Material : G.H. Ryder; ELBS.
3. Engg. Mechanics : A.K. Tayel; Umesh Publishing.
4. Machine Design : P.C. Sharma & D K Agarwal; S.K Kataria.

REFERENCE BOOKS:
1. Fluid Mechanics : A. K. Jain; Khanna publications.
2. Hydraulics & Fluid Mechanics : Jagdish Lal; Metropolitan Book Co.

NOTE : Five out of eight questions are to be attempted, at least one question should be set from each unit.

EE-221-E ELECTRICAL ENGINEERING MATERIALS AND SEMICONDUCTOR DEVICES LAB

L T P		
0 0 2	CLASS WORK	: 25
	EXAM	: 25
	TOTAL	: 50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS :

1. To study V-I characteristics of diode, and its use as a capacitance.

2. Study of the characteristics of transistor in Common Base configuration.

3. Study of the characteristics of transistor in Common Emitter configuration.

4. Study of V-I characteristics of a photo-voltaic cell.

5. Study of characteristics of MOSFET/JFET is CS configuration.

6. To plot characteristics of thyristor.

7. To plot characteristics of UJT .

8. To plot characteristics of diac & Triac.

9. Study of loss factor in a dielectric by an impedance bridge.

10. Study of photo-resist in metal pattern for planar technology/PCB technology.

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-223-E **NETWORK THEORY LAB**

L T P		
0 0 2	CLASS WORK	: 25
	EXAM	: 25
	TOTAL	: 50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS :

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice

NOTE : Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-225-E ELECTROMECHANICAL ENERGY CONVERSION LAB

L T P		
0 0 3	CLASS WORK	: 25
	EXAM	: 25
	TOTAL	: 50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS:

1. To find turns ratio and polarity of a single phase transformer.
2. To perform open and short circuit tests on a single phase transformer.
3. To perform Sumpner's back to back test on single phase transformers.
4. Parallel operation of two single phase transformers.
5. Study of construction of a DC machine.
6. To plot O.C.C of a DC shunt generator and find its Critical Resistance.

6. To perform direct load test of a DC motor.

8. Speed control of a DC motor by armature control and field control methods.
9. To perform open circuit and block rotor tests of an induction motor.
10. Star-delta starting of a three phase induction motor.
11. Plot O.C.C of a synchronous generator.
12. To plot V-curve of a synchronous motor.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-231-E **ELECTRICAL WORKSHOP**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study fluorescent tube light.
5. To study high pressure mercury vapour lamp (H.P.M.V).
6. To study Sodium lamp.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamic & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design, fabricate a PCB for a circuit, wire-up and test.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

HUM-202-E **FUNDAMENTALS OF MANAGEMENT**

L	T	P
3	1	-

Class Work : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 3 Hrs.

UNIT-I

Meaning of management, Definitions of Management, Characteristics of management, Management Vs. Administration. Management-Art, Science and Profession. Importance of Management. Development of Management thoughts.
Principles of Management. The Management Functions, Inter-relationship of Managerial functions.

UNIT-II

Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

UNIT-III

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods**.**

UNIT-IV

Marketing Management - Definition of marketing, Marketing concept, objectives & Functions of marketing.Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

UNIT-V

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

BOOKS RECOMMENDED :

TEXT BOOKS :

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

REFERENCE BOOKS :

1. Principles & Practices of Management **–** L.M. Prasad (Sultan Chand & Sons)
2. Management **–** Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management **–** S.A. Sherlikar (Himalaya Publishing House, Bombay).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

MATH-202-E **NUMERICAL METHODS**

(COMMON FOR EE,EL,CHE,EI,IC & ELECTIVE FOR CSE,IT IN 8th SEM.)

L	T	P
3	1	-

Sessional	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Part-A

Interpolation and curve fitting : Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least square approximations.

Non-Linear Equations : Bisection method, Linear Interpolation methods, Newton's method, Muller's method, fixed-point method.

Simultaneous Linear Equations : Elimination method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method.

Numerical Differentiation and Integration : Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson's rules, Boole's rule and Weddle's rule, Romberg's Integration.

Part-B

Numerical Solution of Ordinary Differential Equations : Taylor series method, Euler and modified Euler method, Runge-Kutta methods, Milne's method, Adams-Moulton method, Power method for Eigen values by iteration.

Numerial Solution of Partial Differential Equations : Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

TEXT BOOKS :

1. Applied Numerical Analysis : Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
2. Numerical Method : E. Balagurusamy T.M.H.

REFERENCE BOOKS :

1. Numerical Methods for Scientific and Engg. Computations : M.K. Jain, S.R.K. Iyenger and R.K. Jain-Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis S.S. Sastry, P.H.I.
3. Numerical Methods in Engg. & Science : B.S. Grewal.

Note: Examiner will set eight questions, taking four from Part-A and four from Part-B. Students will be required to attempt five questions taking atleast two from each part.

EE-202-E **ANALOG ELECTRONICS**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT 1 SEMICONDUCTOR DIODE :
P-N junction and its V-I Characteristics, P-N junction as a rectifier, Switching characteristics of Diode.

UNIT 2 DIODE CIRCUITS :
Diode as a circuit element, the load-line concept, half-wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

UNIT 3 TRANSISTOR AT LOW FREQUENCIES:
Bipolar junction transistor : operation, characteristics, Ebers-moll model of transistor, hybrid model, h-parameters (CE, CB, CC configurations), analysis of a transistor amplifier circuits using h-parameters, emitter follower, Miller's Theorem , frequency response of R-C coupled amplifier.

UNIT 4 TRANSISTOR BIASING :
Operating point, bias stability, collector to base bias, self-bias, emitter bias, bias compensation, thermistor & sensistor compensation.

UNIT 5 TRANSISTOR AT HIGH FREQUENCIES:
Hybrid P model, CE short circuit current gain, frequency response, alpha, cutoff frequency, gain bandwidth product, emitter follower at high frequencies.

UNIT 6 FIELD EFFECT TRANSISTORS :
Junction field effect transistor, pinch off voltage, volt-ampere characteristics, small signal model, MOSFET Enhancement & Depletion mode, V-MOSFET.Common source amplifier, source follower, biasing of FET, applications of FET as a voltage variable resistor (V V R).

UNIT 7 REGULATED POWER SUPPLIES :
Series and shunt voltage regulators, power supply parameters, three terminal IC regulators, SMPS.

TEXT BOOK :
1 .Integrated Electronics: Millman & Halkias ; McGrawHill
2. Electronic circuit analysis and design (Second edition): D.A.Neamen; TMH

REFERENCE BOOKS:
1. Electronics Principles: Malvino ; McGrawHill
2. Electronics Circuits: Donald L. Schilling & Charles Belove ; McGrawHill
3. Electronics Devices & Circuits: Boylestad & Nashelsky ; Pearson.

NOTE: Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-204-E **DIGITAL ELECTRONICS**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT 1 FUNDAMENTALS OF DIGITAL TECHNIQUES :
Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes.

UNIT 2 COMBINATIONAL DESIGN USING GATES:
Design using gates, Karnaugh map and Quine Mcluskey methods of simplification.

UNIT 3 COMBINATIONAL DESIGN USING MSI DEVICES
Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT 4 SEQUENTIAL CIRCUITS:
Flip Flops : S-R, J-K, T, D, master-slave, edge triggered, shift registers, sequence generators, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

UNIT 5 DIGITAL LOGIC FAMILIES:
Switching mode operation of p-n junction, bipolar and MOS. devices. Bipolar logic families:RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

UNIT 6 A/D AND D/A CONVERTERS:
Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters. A/D converters : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT 7 PROGRAMMABLE LOGIC DEVICES:
ROM, PLA, PAL, FPGA and CPLDs.

TEXT BOOK :
1. Modern Digital Electronics(Edition III) : R. P. Jain; TMH

REFERENCE BOOKS :
1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

NOTE : Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-208-E **ELECTROMAGNETIC THEORY**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT1.STATIC ELECTRIC FIE0LDS:
Coulomb's Law, Gauss's Law, potential function, field due to a continuous distribution of charge, equi-potential surfaces, Gauss's Theorem, Poison's equation, Laplace's equation, method of electrical images, capacitance, electro-static energy, boundary conditions, the electro-static uniqueness theorem for field of a charge distribution, Dirac-Delta representation for a point charge and an infinitesimal dipole.

UNIT2. STEADY MAGNETIC FIELDS :
Faraday Induction law, Ampere's Work law in the differential vector form, Ampere's law for a current element, magnetic field due to volume distribution of current and the Dirac-delta function, Ampere's Force Law, magnetic vector potential, vector potential (Alternative derivation), far field of a current distribution, equation of continuity.

UNIT3. TIME VARYING FIELDS :
Equation of continuity for time varying fields, inconsistency of Ampere's law, Maxwell's field equations and their interpretation, solution for free space conditions, electromagnetic waves in a homogeneous medium, propagation of uniform plane-wave, relation between E & H in a uniform plane-wave, wave equations for conducting medium, Maxwell's equations using phasor notation, wave propagation in a conducting medium, conductors, dielectrics, wave propagation in good conductor and good dielectric, depth of penetration, polarization, linear, circular and elliptical,

UNIT4. REFLECTION AND REFRACTION OF E M WAVES:
Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-line analogy, poynting theorem, interpretation of E x H, power loss in a plane conductor.

UNIT5.TRASMISSION LINE THEORY :
Transmission line as a distributed circuit, transmission line equation, travelling ,standing waves , characteristic impedance, input impedance of terminated line, reflection coefficient, VSWR, Smith's chart and its applications.

TEXT BOOK :
1. Electro-magnetic Waves and Radiating System : Jordan & Balmain, PHI.

Reference Books:
1. Engineering Electromagnetics : Hayt; TMH
2. Electro-Magnetics : Krauss J.DF; Mc Graw Hill.

NOTE: 8 questions are to be set –atleast one from each unit. Students have to attempt any five questions.

EE-210-E ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT 1. UNITS STANDARDS AND ERRORS:
S.I. units, Absolute standards(International, Primary, Secondary and Working Standards), True Value, Errors (Gross, Systematic and Random); Static Characteristic of Instruments (Accuracy, Precisionm, Sensitivity, Resolution and threshold).

UNIT 2. MEASURING SYSTEM FUNDAMENTALS:
Classification of Instruments (Based upon mode of measurement -Absolute and Secondary Instruments; Based upon Principle of Operation, Based upon function -Indicating, Recording and Integrating instruments), Generalized Instrument (Block diagram and description of various blocks), The three forces in an Electromechanical indicating instrument (Deflecting controlling and damping forces and the interplay between them), Comparison between gravity and spring controls; Comparison of methods of damping and their suitability for bearing supports, Pivot-less supports (Simple suspension and taut band suspension, scale, information, Instrument cases (Covers).

UNIT 3. MEASURING INSTRUMENTS:
Construction, Operating principle, Torque equation, Shape of scale, use as Ammeter or as Voltmeter(Extension of Range), Use on AC/DC or both, Advantages and disadvantages, Errors (Both on AC/DC) of PMMC types, Electrodynamic Type, Moving iron type (attraction, repulsion and combined attraction, repulsion types.) Hot wire type and Induction type, Electrostatic type Instruments.
UNIT 4. WATTMETERS & ENEGRY METERS:
Construction Operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodynamics and Induction type Wattmeters; and single phase induction type Energy meter, Compensation and creep in energy meter.

UNIT 5. POWER FACTOR & FREQUENCY METERS:
Construction, Operation, principle, Torque equation, Advantages & disadvantages of Single phase power factor meters (Electrodynamic and Moving Iron types) and Frequency meters (Electrical Resonance Type, Ferrodynamic and Electrodynamic types).

UNIT 6. LOW AND HIGH RESISTANCE MEASUREMENTS:
Limitations of wheatstone bridge, Kelvin's double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge and Meggar.

UNIT 7. A.C. BRIDGES:
General balance Equation, Circuit diagram, Phasor diagram Advantages, Disadvantages and Applications of Maxwell's inductance, Maxwells Inducance-Capacitance bridge, Hays, Anderson, Owens, De-Sauty's, Schering and Weins bridges, Shielding and earthing.

TEXT BOOK:
A Course in Electrical and Electronic Measurement & Instrumentation : A. K. Sawhney; dhanpat rai

REFERENCE BOOKS:
1. Electrical Measurments : E.W. Golding
2. Electronic & Electrical Measurment & Instrumention : J.B. Gupta; Kataria & Sons.
3. Electronic Instrumentation & Measurment Technique : W.D.Cooper & A.D.Helfrick.
4. Measuring Systems : E.O.Doeblin; TMH.

NOTE : Eight questions are to be set taking atleast one question should be set from each unit. Five out of eight questions are to be attempted

EE-222-E **ANALOG ELECTRONICS-LAB**

L T P		
0 0 2	CLASS WORK	: 25
	EXAM	: 25
	TOTAL	: 50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS:

1. Study of Half wave & full wave rectifiers.
2. Study of power supply filters.
3. Study of Diode as clipper & clamper.
4. Study of Zener diode as a voltage regulator.
5. Study of CE amplifier for voltage, current & Power gains and input, output impedances..
6. Study of CC amplifier as a buffer.
7. To study the frequency response of RC coupled amplifier.
8. Study of 3-terminal IC regulator.
9. Study of transistor as a constant current source in CE configuration.
10. Study of FET common source amplifier.
11. Study of FET common Drain amplifier.
12. Graphical determination of small signal hybrid parameters of bipolar junction transistor.
13. Study & design of a d.c. voltage doubler.

NOTE : At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-224-E **DIGITAL ELECTRONICS LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

2. Design & realize a given function using K-maps and verify its performance.

3. To verify the operation of multiplexer & Demultiplexer.

4. To verify the operation of comparator.

5. To verify the truth tables of S-R, J-K, T & D type flip flops.

6. To verify the operation of bi-directional shift register.

7. To design & verify the operation of 3-bit synchronous counter.

8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

10. To design & realize a sequence generator for a given sequence using J-K flip-flops.

11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.

12. Design a 4-bit shift-register and verify its operation . Verify the operation of a ring counter and a Johnson counter.

NOTE : At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-230-E ELECTRICAL MEASURMENT AND MEASURING INSTRUMENT LAB

L	T	P
0	0	2

Class Work : 25
Exam : 25
Total : 50
Duration of Exam : 3hrs

LIST OF EXPERIMENTS:

1. To identify the meters from the given lot.
2. To convert and calibrate a D' Arsonnal type galvanometer into a voltmeter and an ammeter.
3. To calibrate an energy meter with the help of a standard wattmeter and a stop watch.
4. To measure power and p.f by three ammeter method.
5. To measure power and p.f by three voltmeter method.
6. To measure power and p.f in three phase circuit by two wattmeter method.
7. To measure capacitance by De Sauty's bridge.
8. To measure inductance by maxwell's bridge.
9. To measure frequency by Wien's bridge.
10. To measure the power with the help of C.T and P.T.
11. To measure magnitude and phase angle of a voltage by rectangular type potentiometer.
12. To measure magnitude and phase angle of a voltage by polar type potentiometer.
13. To measure low resistance by Kelvin's double bridge.
14. To measure high resistence by loss of charge method.

NOTE : At least ten experiments are to performed , out of which at least seven experiments should be per from above list. Remaining three experiments may either be performed from the above list or designed & the concerned institution as per the scope of the syllabus.

MATH-204-E **NUMERICAL METHODS LAB.**
(COMMON FOR EE,EL,CHE,EI)

L	T	P
-	-	2

Class Work	:	25 Marks
Exam.	:	25 Marks
Total	:	50 Marks
Duration of exam.	:	2 Hours

WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C/C++/MATLAB

1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Newton's method.
3. Curve fitting by least - square approximations.
4. To solve the system of linear equations using Gauss-Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jorden method.
7. To Integrate numerically using Trapezoidal rule.
8. To Integrate numerically using Simpson's rules.
9. To find the largest eigen value of a matrix by power-method.
10. To find numerical solution of ordinary differential equations by Euler's method.
11. To find numerical solution of ordinary differential equations by Runge-Kutta method.
12. To find numerical solution of ordinary differential equations by Milne's method.
13. To find the numerical solution of Laplace equation.
14. To find numerical solution of wave equation.
15. To find numerical solution of heat equation.

BOOKS SUGGESTED :

1. Applied Numerical Analysis by Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
2. Numerical Methods : E. Balagurusamy T.M.H.

Note: Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed by the concerned institution as per the scope of the syllabus.

IC-301-E TRANDUCERS & SIGNAL CONDITIONING

L T P	
3 1 -	Theory : 100 Marks
	Class work : 50 Marks
	Total : 150 Marks
	Duration of Exam : 3 Hrs.

UNIT 1. INTRODUCTION:
Overview, primary & secondary transducers,. Active & passive transducers.

UNIT 2. INDUCTIVE TRANSDUCERS:
LVDT, RVDT & uses. Transducers using L, Mu(u), G, N & Reluctance change.

UNIT 3 CAPACITIVE TRANSDUCERS:
Use of changes in A, d, Ed(Epsilon), differential arrangement.

UNIT 4. RESISTIVE TRANSDUCERS:
Potentiometers, loading effect, power rating linearity & sensitivity, Helipots, Strain gauges, unbounded & bounded types, wire & foil strain gauges.

UNIT 5. MEASUREMENT OF NON-ELECTRICAL QUANTITIES:
Measurement of linear & rotatory displacements, strain, linear & angular velocity, liquid level & flow, thickness & temperature.

UNIT 6 . SIGNAL CONDITIONING:
Instrumentation amplifier characteristics, CMRR, Balanced modulator & demodulator, filters, voltage sensitive bridge & current sensitive bridge. Push-pull transducers, Blumlein bridge, integration, differentiation & sampling, A/D & D/A conversion, choppers, voltage to time A/D conversion, voltage to freq. Conversion concept & methods.

TEXT BOOK:
1. A course in Electrical & Electronic Measurement & Instrumentation : A.K.Sawhney; Dhanpat Rai.

REFERENCE. BOOKS:
1. Measurement Systems : E.O. Doeblin;TMH.
2. Electronic Instrumentation & Measurement Techniques : W.D. Cooper & A.D. Helfrick ; PHI.

NOTE : Eight questions are to be set in all by taking at least one question from each unit. Students will be required to attempt five questions in all.

IC-303-E **LINEAR CONTROL SYSTEM**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT1. INTRODUCTORY CONCEPTS :
System/Plant Model, Types of models illustrative examples of plants and their inputs and outputs, controller, servomechanism, regulating systems, linear time-invariant (LTI), Time-varying, and causal systems; open loop control system, closed control system, illustrative examples of open-loop and feedback control systems, continuous time and sampled data systems. Effects of feedback on sensitivity (to parameter variations), stability, external disturbance (noise), overall gain etc. Introductory remarks about non-linear control systems.

UNIT 2. MATHEMATICAL MODELLING :
Concept of Transfer function, relationship between transfer function and impulse response, order of a system, introduction to state variable modelling approach, state variable models (only equations) of LTD, time varying, continuous time and discrete-time systems. Block diagram, block diagram algebra, signal flow graphs and associated terms/definitions, Mason's formula & its application, characteristic equation, derivation of transfer functions of liquid level, electro-mechanical, mechanical & electrical systems.

UNIT 3. TIME DOMAIN ANALYSIS :
Typical test signals, time response of Ist order systems to various standard inputs, Time response of 2nd order system to step input, relationship between location of roots of characteristic equation and w and wn, time domain specifications(general and of an under damped 2nd order system), steady state error and error constants, dominant closed loop poles, concept of stability, pole-zero configuration and stability, necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion, relative stability.

UNIT 4. ROOT LOCUS TECHNIQUES :
Root locus concept, development of root loci for various systems, stability considerations.

UNIT5. FREQUENCY DOMAIN ANALYSIS:
Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots; stability , GM and PM, relative stability frequency response specifications.

UNIT 6. CONTROL SYSTEM COMPONENTS:
Synchros, AC and DC techo-generators, servo motors, stepper motors & their applications.

TEXT BOOK:
1. Control System Engg : I.J.Nagrath & M.Gopal; New Age India.

REFERENCE BOOKS:
1. Automatic Control Systems : B.C.Kuo; PHI.
2. Modern Control Engg : K.Ogate; PHI.
3. Control Systems: Principles & Designing : Madan Gopal; TMH.
4. Modern Control Engg. :R.C.Dorf; Addison Wesley.

NOTE : Eight questions are to be set at least one from each unit. Students have to attempt five questions.

CSE- 210 E **Computer Architecture & Organization**

L	T	P	Class Work: 50
3	1	-	Exam: 100
			Total: 150
			Duration of Exam: 3 Hrs.

Unit-1: Basic Principles: Boolean algebra and Logic gates, Combinational logic blocks(Adders, Multiplexers, Encoders, de-coder), Sequential logic blocks(Latches, Flip-Flops, Registers, Counters)

Unit-2: General System Architecture: Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.

Unit-3: Instruction Set Architecture: Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid); Language of the machine: 8086 ; simulation using MSAM.

Unit-4: Basic non pipelined CPU Architecture: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining.

Unit-5: Memory Hierarchy & I/O Techniques: The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations.

Unit-6: Introduction to Parallelism: Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl's law; Instruction level parallelism (pipelining, super scaling –basic features); Processor level parallelism (Multiprocessor systems overview).

Unit-7: Computer Organization [80x86]: Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro-program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy.

Text Books:

- Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
- Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.

Reference Books:

- Operating Systems Internals and Design Principles by William Stallings,4th edition, 2001, Prentice-Hall Upper Saddle River, New Jersey
- Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, Safwat Zaky.
- Structured Computer Organisation by A.S. Tanenbaum, 4th edition, Prentice-Hall of India, 1999, Eastern Economic Edition.
- Computer Organisation & Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.
- Computer System Architecture by M. Mano, 2001, Prentice-Hall.
- Computer Architecture- Nicholas Carter, 2002, T.M.H.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

EE-303-E ELECTRONIC MEASUREMENT AND INSTRUMENTATION

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT 1. OSCILLOSCOPE:

Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storageoscilloscope.

UNIT 2. ELECTRONIC INSTRUMENTS:
Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

UNIT 3. GENERATION & ANALYSIS OF WAVEFORMS:
Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

UNIT 4. FREQUENCY & TIME MEASUREMENT:
Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

UNIT 5. DISPLAY DEVICES:

Nixie tubes, LED's LCD's, discharge devices.

UNIT 6 TRANSDUCERS:
Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

UNIT 7 INTRODUCTION TO SIGNAL CONDITIONING:
DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

TEXT BOOK:

1. A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS.

1. Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt five questions in all.

EE-305-E **ANALOG ELECTRONIC CIRCUITS**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT1. SINGLE AND MULTISTAGE AMPLIFIERS:
Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier .

UNIT2. FEEDBACK AMPLIFIERS :
Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

UNIT3. OSCILLATORS:
Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, generalform of oscillator circuit, wien-bridge oscillator, crystal oscillator.

UNIT4. POWER AMPLIFIERS:
Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

UNIT5. OPERATIONAL AMPLIFIERS :
Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

UNIT6. LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :
Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

UNIT7. NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :
Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators , Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

TEXT BOOK:
1. Integrated Electronics: Milman Halkias, TMH.
2. Microelectronic Circuits : Sedra & Smith.

REFERENCE BOOKS:
1. Operational Amplifiers:Gaikwad
2. Electronic Circuit Analysis and Design (Second edition) : D.A.Neamen; TMH

NOTE: Eight questions are to be set – at least one from each unit. Students have to attempt five questions.

EE-309-E **MICROPROCESSORS AND INTERFACING**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

PART A

UNIT1. THE 8085 PROCESSOR :
Introduction to microprocessor, 8085 microprocessor: Architecture, instruction set, interrupt structure, and assembly language programming.

UNIT2. THE 8086 MICROPROCESSOR ARCHITECTURE:
Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

UNIT3. INSTRUCTION SET OF 8086:
Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

PART B

UNIT4. INTERFACING DEVICE :
The 8255 PPI chip: Architecture, control words, modes and examples.

UNIT 5. DMA :
Introduction to DMA process, 8237 DMA controller,

UNIT6. INTERRUPT AND TIMER :
8259 Programmable interrupt controller, Programmable interval timer chips.

TEXT BOOKS :
1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

REFERENCE BOOKS:
1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn
   A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

NOTE: 8 questions are to be set selecting FIVE questions from PART A and THREE questions from PART- B .Students have to attempt any five questions.

EE-323-E ELECTRONIC MEASUREMENT AND INSTRUMENTATION-LAB

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurement of temperature using R.T.D.
4. Measurement of temperature using Thermocouple.
5. Measurement of pressure using Strain Guage.
6. Measurement of pressure using Piezo-Electric Pick up.
7. Measurement of distance using Capacitive Pick up.
8. Measurement of distance using Inductive Pick up.
9. Measurement of speed of DC Motor using Magnetic Pick up.
10. Measurement of speed of DC Motor using Photo Electric Pick up.

NOTE : 1. At least ten experiments have to be performed in the semester.
2. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-303-C.

EE-325-E **ANALOG ELECTRONIC CIRCUITS LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.

2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth

3. Study the effect of voltage series, current series, voltage shunt, and current shunt feed-back on amplifier using
discrete components.

4. Design & realize inverting amplifier, non-inverting and buffer amplifier using 741 Op Amp.

5. Verify the operation of a differentiator circuit using 741 op amp and show that it acts as a high pass filter.

6. Verify the operation of a integrator circuit using 741 op amp and show that it acts as a low pass filter.

7. Design and verify the operations of op amp adder and subtractor circuits.

8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on
the bandwidth and gain of the amplifier.

9. Design & realize using op amp 741, Wein -bridge oscillator.

10. To design & realize using op amp 741, square wave generator.

11.To design & realize using op amp 741, logarithmic amplifier & VCCS.

NOTE: At least ten experiments are to be performed. Seven experiments should be performed from the above
list and the remaining three experiments can be either from the above list or set by the concerned institution as per the scope of the syllabus of EE-305-C.

EE-329-E **MICROPROCESSORS AND INTERFACING LAB**

L T P	CLASS WORK	:	25
0 0 2	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. Study of 8085 Microprocessor kit.

2. Write a program using 8085 and verify for :
   a. Addition of two 8-bit numbers.
   b. Addition of two 8-bit numbers (with carry).

3. Write a program using 8085 and verify for :
   a. 8-bit subtraction (display borrow)
   b. 16-bit subtraction (display borrow)

4. Write a program using 8085 for multiplication of two 8- bit numbers by repeated addition method. Check for minimum number of additions and test for typical data.

5. Write a program using 8085 for multiplication of two 8- bit numbers by bit rotation method and verify.

6. Write a program using 8085 for division of two 8- bit numbers by repeated subtraction method and test for typical data.

7. Write a program using 8085 for dividing two 8- bit numbers by bit rotation method and test for typical data.

8. Study of 8086 microprocessor kit

9. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double
   Word division and verify.

10. Write a program using 8086 for finding the square root of a given number and verify.

11. Write a program using 8086 for copying 12 bytes of data from source to destination and verify.

12. Write a program using 8086 and verify for:
    a. Finding the largest number from an array.
    b. Finding the smallest number from an array.

13. Write a program using 8086 for arranging an array of numbers in descending order and verify.

14. Write a program using 8086 for arranging an array of numbers in ascending order and verify.

15. Write a program for finding square of a number using look-up table and verify. .

16. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor
    and 8255 PPI.

17. Write a program to control the operation of stepper motor using 8085/8086 microprocessor and 8255 PPI.

NOTE: At least ten experiments have to be performed in the semester out of which seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-309-C.

IC-321-E **LINEAR CONTROL SYSTEM LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. To study A.C. servo motor and to plot its torque speed characteristics.

2. To study D.C. servo motor and to plot its torque speed characteristics.

3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for :
   (a) series connected mode
   (b) parallel connected mode.

4. To plot the load current v/s control current characteristics for self exited mode of the magnetic amplifier.

5. To study the synchro & to:
   (a) Use the synchro pair (synchro transmitter & control transformer) as an error detector.

   (b)Plot stator voltage v/s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.

6. To use the synchro pair (synchro transmitter & synchro motor) as a torque trans mitter.

7. (a) To demonstrate simple motor driven closed loop position control system.
   (b) To study and demonstrate simple closed loop speed control system.

8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots .

9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.

10. To implement a PID controller for level control of a pilot plant.

11. To implement a PID controller for temperature control of a pilot plant.

12. To study the MATLAB package for simulation of control system design.

NOTE : At least ten experiments have to be performed in the semester, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-304-C.

IC-405-E COMPUTER BASED INSTRUMENTATION AND CONTROL

L T P	Theory	: 100 Marks
3 1 -	Class Work	: 50 Marks
	Total	: 150 Marks
	Duration of Exam	: 3Hrs

UNIT 1. INTRODUCTION:
Necessity and functions of computers. Level of automation and economy of computer control. Centralized computer control Vs distributed computer control.

UNIT 2. COMPUTER ARCHITECTURE:
Micro and mini computer, functional models of I.O. system .

UNIT 3. INTERFACING:
Sampling; Multiplexing; A/D and D/A converters, interfacing with different types of transducers - Analog / Digital, Electrical and non electrical selection of sensors; Micro computer interfacing standard buses Serial buses; Serial data communication protocols.

UNIT 4. STRUCTURAL STUDY OF AUTOMATIC PROCESS CONTROL:
Fundamental of automatic process control, building block of automatic system, direct and distributed digital control system. Programmable controllers.

UNIT 5. PERSONAL COMPUTER IN REAL LIFE ENVIRONMENT:
Introduction, personal computer: system and facility, PC bus and signals, interrupts, interfacing PC with outer world, PC in RTE, Real time application of IBM PC PC based distributed control system

UNIT 6. PROGRAMMING AND APPLICATION:
Modeling and simulation for plant automation, PLC Architecture and programming of PLC, industrial control application: cement plant, thermal power plant , water treatment plant, steel plant,

TEXT BOOK :
1. Computer based industrial control: Krishan Kant,; PHI

NOTE : Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

IC-302-E **NON-LINEAR CONTROL SYSTEM**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT 1. INTRODUCTION:
Nonlinear components such as dead band, backlash, relay, saturation. Difficulties in nonlinear modelling & control
.
UNIT 2. PHASE-PLANE ANALYSIS:
Phase portraits of 2nd order systems, method of isoclines, phase portrait of 2nd order system with non-linearities, limit cycles, singular points.

UNIT 3. DESCRIBING FUNCTION ANALYSIS:
Definition, limitations, use of DF for stability analysis, DF of ideal relay, relay with hysteresis, dead zone, saturation, coulomb friction, backlash etc.

UNIT 4. STATE VARIABLE TECHNIQUES:
State space modelling, state transition matrix. State models for linear continuous time systems, State variables and linear discrete time systems, Diagonalisation, solution of state equations, conversion of state variable model to transfer function, conversion of transfer function to canonical state variable model. Concept of Controllability and Observability, test for Controllability and Observability.

UNIT 5. LYAPUNOV STABILITY ANALYSIS:
Introduction, basic concepts, stability definitions, stability theorems, lyapunov function for non-linear systems and linear systems. Model reference adaptive system, discrete time system.

TEXT BOOK:
1. Control System Engineering (Third Edition): I.J Nagrath and M.Gopal; New Age Internatinal

REFERENCE BOOKS:
1. Control Systems Principles and Design (second edition) : M.Gopal; TMH.
2. Digital Control And State Variable Methods : M.Gopal; TMH.

NOTE : Eight questions are to be set - at least one from each unit. Students have to attempt five questions in all.

IC-304-E **TELEMETRY DATA-PROCESSING AND RECORDING**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT 1. INTRODUCTION:
Overview, Block diagram of a generalized instrument & description of its various blocks.

UNIT 2. TELEMETRY:
Modes of data transmission, D.C. telemetry system, voltage telemetry system, current telemetry system, A.C telemetry system., AM , FM, phase modulation, pulse telemetry system, PAM,. Pulse frequency system, Pulse duration modulation (PDM), digital telemetry, Pulse Code Modulation, Transmission channels & media, wire line channels, radio channels, microwave channels, power line carrier channels, Multiplexing in telemetry systems, TDM.

UNIT 3. DATA PROCESSING & RECORDING:
Digital V/s analog processing, quantization, aperture, Electronic counters, R S flip flop, decade counter, Digital display methods, SS display, LED, LCD, Nixie Tube, Decade counting assembly (DCA), Decimal decoders, BCD to S-S converter, BCD to dot-matrix converter, resolution & sensitivity & accuracy in digital meters.

TEXT BOOK:
A course in Elec. & Elect. Measurement & Instrumentation :A.K. Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS:
1. Measurement Systems & Analysis: E.O. Doeblien; TMH.
2 Electronics Instrumentation & Measurement Techniques: W.D.Cooper and A.D.Helfrick.

NOTE : Eight questions are to be set - at least one question from unit 1 and at least three each from units 2 and 3. Students will be required to attempt five questions in all.

IC-306-E **BIO- MEDICAL INSTRUMENTATION**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT 1. INTRODUCTION:
Origin of bio-electric signals, recording systems, source of low level recording circuits, preamplifiers, main amplifier and driver stage, writing systems, types of recorders and transducers used.

UNIT 2. BIO-MEDICAL RECORDERS AND DISPLAY SYSTEMS:
ECG, EEG, EMG, photo-cardiograph and electrodes used for ECG, EEG and EMG, oscilloscopes used for biomedical measurements, multi-channel display.

UNIT 3. BLOOD GAS ANALYSERS:
B.P measurement, patient monitoring system, blood PH measurement, blood PO_2, PCO_2, complete blood gas analyser.

UNIT 4. SPECIAL MACHINES:
MRI, and ultrasonic imaging systems, x-ray machine, x-ray computed tomography, basic NMR components, physics of ultrasonic rays, A-scanner, B-scanner, echocardiograph, display devices for ultra sonic imaging.

UNIT5. CARDIAC PACEMAKERS AND DEFIBRILLATORS:
External pacemaker, implantable pace maker, programmable pace maker, leads and electrodes used , DC defibrillators, electrodes used, implantable defibrillators.

UNIT6. LASER APPLICATIONS IN BIOMEDICAL FIELDS:
Lasers: ruby laser , argon laser, helium- neon laser, CO_2 laser, Nd-YAG laser

TEXT BOOKS:
1. Introduction to Bio-medical Instrumentation : R.S khandpur.
2. Bio-medical instrumentation: Crambell.

NOTE : Eight questions are to be set –one from each unit. Students have to attempt any five questions.

EE-310-E **DIGITAL SYSTEM DESIGN**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT 1. INTRODUCTION :
Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, logical operators.Types of delays Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

UNIT 2. VHDL STATEMENTS :
Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.
Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

UNIT 3. COMBINATIONAL CIRCUIT DESIGN:
VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

UNIT 4. SEQUENTIAL CIRCUITS DESIGN :
VHDL Models and Simulation of Sequential Circuits
Shift Registers, Counters etc.

UNIT 5. DESIGN OF MICROCOMPUTER :
Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL

UNIT 6. DESIGN WITH CPLDs AND FPGAs :
Progr ammable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

REFERENCE BOOKS:
1. IEEE Standard VHDL Language Reference Manual (1993).
2. Digital Design and Modelling with VHDL and Synthesis : KC Chang; IEEE Computer Society Press.
3. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
4. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
5. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
6. VHDL-IV Edition :Perry; TMH (2002)
7. "Introduction to Digital Systems" : Ercegovac. Lang & Moreno; John Wiley (1999).
8. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
9. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).

NOTE : Eight questions are to be set - at least one question from each unit. Students will be required to attempt five questions in all.

EE-317-E **POWER ELECTRONICS**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT1. INTRODUCTION :
Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT & SIT.

UNIT2. SCR:
Ratings and protections, series and parallel connections, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors; pulse transformer and opto-coupler, commutation techniques.

UNIT3. AC REGULATORS:
Types of regulator, equation of load current, calculation of extinction angle, output voltage equation, harmonics in load voltage and synchronous tap changer, three phase regulator.

UNIT4. CONVERTERS :
One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand, effect of source inductance, introduction to four quadrant / dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

UNIT5. INVERTERS :
Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray half bridge and full bridge inverters, McMurray -Bedford half bridge and bridge inverters, brief description of parallel and series inverters, current source inverter (CSI), transistor and MOSFET based inverters.

UNIT6. CHOPPERS :
Basic scheme, output voltage control techniques, one, two, and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

UNIT7. CYCLOCONVERTERS :
Basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverters.

UNIT8. DRIVES:
Introduction to electric drives: DC drives – converter and chopper fed dc drives, ac drives - stator voltage control, V/f control, rotor resistance control, static Scherbius system and static Kramer systems.

TEXT BOOK:
1. Power Electronics : MH Rashid; PHI

REFERENCE BOOKS :
1. Power Electronics : PC Sen; TMH
2. Power Electronics : HC Rai; Galgotia
3. Thyristorised Power Controllers : GK Dubey, PHI
4. Power Electronics and Introduction to Drives : A.K.Gupta and L.P.Singh;Dhanpat Rai
5. Power Electronics: P.S Bhimra.

NOTE : Eight questions are to be set –one from each unit. Students have to attempt any five questions.

EE-330-E **DIGITAL SYSTEM DESIGN LAB**

L T P		
0 0 2	CLASS WORK	: 25
	EXAM	: 25
	TOTAL	: 50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS:

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. half adder
   b. full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. multiplexer
   b. demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. decoder
   b. encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6 Write a VHDL program for a code converter and check the wave forms and the hardware generated
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
8. Write a VHDL program for a counter and check the wave forms and the hardware generated
9. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a. register
   b. shift register
10. Implement any three (given above) on FPGA/CPLD kit

NOTE : Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

EE-331-E **ELECTRONIC CIRCUIT SIMULATION LAB**

L T P		
0 0 2	CLASS WORK	: 25
	EXAM	: 25
	TOTAL	: 50
	DURATION OF EXAM:	3 HRS

LIST OF EXPERIMENTS:

1. Simulate and study half-wave, full-wave, and bridge-rectifier using PSPICE windows
2. Simulate and study diode clipper and clamper circuits using PSPICE windows
3. Simulate and study emitter bias and fixed bias BJT and JFET circuits using PSPICE windows, and determine quescient conditions.
4. Simulate a common emitter amplifier using self biasing and study the effect of variation in emitter resistor on voltage gain , input and output impedance using PSPICE windows .
5. Determine the frequency response of Vo/Vs for CE BJT amplifier using PSPICE windows. Study the effect of cascading of two stages on band width.
6. Simulate and study Darlington pair amplifier circuit using PSPICE windows and determine dc bias and output ac voltage .
7. Study an operational amplifier using PSPICE windows and find out: CMMR, gain band width product, slew rate, 3-db frequency, and input offset voltage.
8. Simulate and study active low pass, high pass, and band pass filters using PSPICE windows.
9. Simulate and study class A, B, C, and AB amplifier using PSPICE windows.
10. Study the operation of 555 timer oscillator using PSPICE.
11. Simulate logic expression…….and determine its truth table.
12. Simulate logic expression of full adder circuit and determine its truth table.
13. Simulate a synchronous 4-bit counter and determine its count sequence.
14. Simulate a master-slave flip-flop using NAND gates and study its operation. Study the operation of asynchronous preset and clear .

NOTE **:** 1. At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

EE-321-E **POWER ELECTRONICS-LAB**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

15. Study of characteristics of diode, thyristor and triac.
16. Study of characteristics of transistor and MOSFET.
17. Study of R and R-C firing circuits.
18. Study of UJT firing circuit.
19. Study of complementary voltage commutation using a lamp flasher.
20. Study of complementary voltage commutation using ring counter.
21. Study of thyristorised d-c circuit breaker.
22. Study of a.c. phase control.
23. Study of full wave converter.
24. Study of dc chopper.
25. Study of series inverter.
26. Study of bridge inverter.
27. Study of single phase cycloconverter.

NOTE : At least ten experiments have to be performed in the semester. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-308-C.

IC-421-E **INDUSTRIAL PROCESS CONTROL LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. To study response of single & multiple Ist order systems in series.

a) Coupled

b) on-coupled

2. To perform PID control on Ist order system without lag(on a pilot plant).

3. To perform PID control on a non-coupled & coupled two-tank system(Pilot plant)

4. To perform PID control on a 2nd order system with lag.

5. To determine the system T.F. by conducting step test.

6. To determine system T.F. by conducting freq. Test.

7. PLC programming.

NOTE: At least ten experiments have to be performed in the semester, taking seven experiments of the above list and three be set by the concerned institution as per the scope of syllabus contents of IC-401-C.

IC-403-E **EMBEDDED SYSTEM DESIGN**

L	T	P
3	1	-

Class Work : 50 Marks
Exam : 100 Marks
Total : 150 Marks
Duration of Exam : 3 Hrs.

UNIT 1 : INTRODUCTION

Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton , CISC V/S RISC; microcontrollers memory types; microcontrollers features : clocking, i/o pins, interrupts, timers, peripherals.

UNIT 2 : MICROCONTROLLER ARCHITECTURE
Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

UNIT 3 : INTERRUPTS AND I/O PORTS
Interrupt logic, Timer2 scalar initialization, IntService Interrupt service routine, loop time subroutine, External interrupts and timers, Synchronous serial port module, Serial peripheral device, O/p port Expansion, I/p port expansion, UART.

UNIT 4 : SOFTWARE
Development tools/ environments, Assembly language programming style, Interpreters, High level languages, Intel hex format object files, Debugging.

UNIT 5 : PROGRAMMING WITH MICROCONTROLLERS
Arithmetic operations, Bit addressing, Loop control, Stack operation, Subroutines, RAM direct addressing, state machines, Oscillators, Timer Interrupts, Memory mapped I/O.

UNIT 6 : DESINING USING MICROCONTROLLERS
Music box, Mouse wheel turning, PWM motor control, Aircraft Demonstration, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor, Magnetic Field Sensor.

TEXT BOOK:
1. Design with PIC Microcontrollers by John B. Peatman , Pearson.

REFERENCE BOOKS :
1. Programming and Customizing the 8051 Microcontroller : Predko ; TMH.
2. Designing Embedded Hardware : John Catsoulis ;SHROFF PUB. & DISTR. ND.
3. Programming Embedded Systems in C and C++ : Michael Barr; SHROFF PUB. & DISTR. ND.

EE-407-E **DIGITAL SIGNAL PROCESSING**

L T P			
3 1 0	CLASS WORK	:	50
	EXAM	:	100
	TOTAL	:	150
	DURATION OF EXAM:		3 HRS

UNIT1. DISCRETE-TIME SIGNALS:
Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems.

UNIT2. DISCRETE-TIME SYSTEMS :
Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

UNIT3. SAMPLING OF TIME SIGNALS:
Sampling theorem, application, frequency domain representation of sampling, reconstruction of band limited signal from its samples. discrete time processing of continuous time signals, changing the sampling rate using discrete time processing.

UNIT4. Z-TRANSFORM :
Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications of Z-transform.

UNIT5. BASICS OF DIGITAL FILTERS :
Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters : window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP, DSP algorithm implementation consideration. Applications of DSP.

UNIT6. MULTIRATE DIGITAL SIGNAL PROCESSING:
Introduction to multirate digital signal processing, sampling rate conversion, filter structures, multistage decimator and interpolators, digital filter banks.

TEXT BOOKS :
1. Digital Signal Processing : Proakis and Manolakis; PHI
2. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH

REFERENCE BOOKS:
1. Digital Signal Processing: Alon V. Oppenhelm;PHI
2. Digital Signal processing(II-Edition): Mitra, TMH

NOTE : Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

IC-421-E **INDUSTRIAL PROCESS CONTROL LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

1. To study response of single & multiple Ist order systems in series.

c) Coupled

d) on-coupled

2. To perform PID control on Ist order system without lag(on a pilot plant).

3. To perform PID control on a non-coupled & coupled two-tank system(Pilot plant)

4. To perform PID control on a 2nd order system with lag.

5. To determine the system T.F. by conducting step test.

6. To determine system T.F. by conducting freq. Test.

7. PLC programming.

NOTE: At least ten experiments have to be performed in the semester, taking seven experiments of the above list and three be set by the concerned institution as per the scope of syllabus contents of IC-401-C.

IC-423-E **INSTRUMENTATION LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:3 HRS		

Students have to Performed 10 Experiments based on various Instrumentation models/ kits for parameter measurements.

EE-427-E **DIGITAL SIGNAL PROCESSING LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

LIST OF EXPERIMENTS:

Perform the experiments using MATLAB:

1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. To develop program for discrete convolution.
3. To develop program for discrete correlation.
4. To understand stability test.
5. To understand sampling theorem.
6. To design analog filter(low-pass, high pass, band-pass, band-stop).
7. To design digital IIR filters(low-pass, high pass, band-pass, band-stop).
8. To design FIR filters using windows technique.
9. To design a program to compare direct realization values of IIR digital filter
10. To develop a program for computing parallel realization values of IIR digital filter.
11. To develop a program for computing cascade realization values of IIR digital filter
12. To develop a program for computing inverse Z-transform of a rational transfer function.]

NOTE: At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

IC-402-E **STOCHASTIC PROCESSES**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT 1 INTRODUCTION:
Overview, limitations of deterministic control & processes.

UNIT 2 PROBABILITY & AXIOMS:
Definition, axioms of probability , conditional probability.

UNIT 3 REPEATED TRIALS:
Combined experiments, Bernoulli trials, Asymptotic theorems, Poisson theorem, Baye's theorem & statistics.

UNIT 4 RANDOM VARIABLES:
Distribution & density functions, conditional distributions, Total probability & Baye's theorem. Mean and variance, moments, characteristics. Functions, two random variables, moments & conditional statistics.

UNIT 5 STOCHASTIC PROCESSES:
Stationary processes systems with stochastic inputs; Ergodicity correlation and spectra.

TEXT BOOK:
Probability, Ranbdom variables & Stochastic Processes : Athanasios Papoulis; Mc Graw-Hill.

NOTE : Eight questions are to be set - at least one question from each unit. Students have to attempt five questions in all.

IC-404-E **FUZZY CONTROL SYSTEMS**

L T P		
3 1 -	Theory	: 100 Marks
.	Class Work	: 50 Marks
	Total	: 150 Marks
	Duration of exam.	: 3 hours

UNIT 1. INTRODUCTION:
Fuzzy control from an industrial perspective, knowledge-based control-lers, knowledge representation in KBC 's.

UNIT 2. THE MATHEMATICS OF FUZZY CONTROL:
Vagueness, fuzzy logic versus probability theory, fuzzy sets, their properties & operations on fuzzy sets, fuzzy relations & operations on fuzzy relations, the Extension Principle, Fuzzy propositions, Tile Compositional Rule of Inference, Different implications, Representing a set of rules.

UNIT 3. FKBC DESIGN PARAMETERS:
The PKBC architecture, choice of variables & content of rules, Derivation of rules, choice of membership functions, choice of scaling factors, choice of fuzjfication procedure, choice of defuz:zjfication procedure, comparison and evaluation of defuz:zjfication methods.

UNIT 4. NONLINEAR FUZZY CONTROL:
The Control Problem, The FKBC as a Non-Linear Transfer Element, Types of FKBC such as Pill-like FKBC, Sliding Mode FKBC, Sugeno FKBC.

UNIT 5. ADAPTIVE FUZZY CONTROL DESIGN & PERFORMANCE EVALUATIO:
Approaches to Design such as membership function tuning using gradient descent, membership function tuning using performance criteria, the self-organizing controller, model based controller.

UNIT 6. STABILITY OF FUZZY CONTROL SYSTEMS:
The State space approach, Stability and robust-ness Ll'ldices, input-output stability, circle criterion, the conicity criterion.

TEXT BOOK :
1. "An Introduction to Fuzzy Conu'ol" : D.,Driankov, H.Hellendoom & M.Reinfrank.; Narosa

REFERENCE BOOK:
1. "Fuzzy Control Systems" : Abraham Kandel & Gideon Imngholz ; Narosa New Delhi.

Note: Eight questions are to be set at least one from each unit. Students have to attempt five questions in all.

IC-424-E **FUZZY CONTROL LAB**

L T P			
0 0 2	CLASS WORK	:	25
	EXAM	:	25
	TOTAL	:	50
	DURATION OF EXAM:		3 HRS

At least ten experiments based on the syllabus of IC-402-C (Fuzzy Control Systems) be developed at the Institution Level. The students will be required to perform at least eight experiments in the semester.

HUM-451-E **LANGUAGE SKILLS FOR ENGINEERS**
SEMESTER VII (ELECTIVE)

L	T	P
4	-	-

Class Work : 50 Marks
Exam : 80 Marks
Practical/Presentation: 20
Total : 150 Marks
Duration of Exam : 3 Hrs

The real challenge before the students starts when they cross the threshold of the college after completing their degree. They, all of a sudden, find themselves competing for job/ P.G. Degrees, through various entrance tests and interviews. Verbal ability forms a major portion of these tests. Without sound language skills and its semantic-syntactic know-how, the students with engineering background find themselves almost under- prepared for such tests. With this difficulty of students in mind, this course is proposed to make them technically proficient in handling the language skills required in competitive exams. The course would expose students to almost all variety of items, the common run of such tests as CAT, GMAT etc. And in the context of LPG, this cutting edge competence becomes imperative, and no professional education can afford to overlook this aspect.

COURSE CONTENT:

UNIT I

Remedial English: Parts of speech; Gerunds, participles and infinitives; Clauses; Sentence-constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors - agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view - consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

UNIT II

Vocabulary: Methods of building vocabulary - etymological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused; synonyms and homonyms; one word substitutes; verbal idioms.

UNIT III

Punctuation and Mechanics: End Punctuation; Internal Punctuation; Word Punctuation.

UNIT IV

Comprehension: Abstracting; Summarising; Observations, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

UNIT V

Presentation: Oral presentation - Extempore, discussion on topics of contemporary relevance, interviews.

SUGGESTED READING:

1. *Working with Words* by R.Gairns and S.Redman, Cambridge University Press, London.
2. *Meanings into Words – Upper Intermediate Students Book,* Doff/jones, Foundation Books (Cambridge university Press), Delhi.
3. *A Practical English Grammar* by A.J. Thomson and A.V. Martinet, OUP, Delhi.
4. *Examine your English* by Margaret M. Maison, Orient Longman, New Delhi.
5. *A Practical Guide to Colloquial Idiom* by W.J. Ball, Longman.
6. *A guide to Correct English* by L.A. Hill, Oxford.

7.Structural Essentials of English by H. Whitehall, Longman.
8*. Advanced English Practice* by B.D. Graver, OUP. Delhi.
9.*Public Speaking*, Sudha Publication Pvt. Ltd., New Delhi.
10.*Group Discussion*, Sudha Publication Pvt. Ltd., New Delhi.

SCHEME OF EXAMINATION:

(A) THEORETICAL:

The pattern of the exam would be more or less like the pattern of the competitive exams. (i.e., OBJECTIVE TYPE) like CAT G-MAT etc., as far as the units I, II, III and IV are concerned.

Unit-I, II, III: (30,20,10 Marks respectively)

The first section of the question paper will have 110 objective type questions with no choice at all. These 110(60+40+10) questions will cover all the first three units (I, II, III) of the syllabus and would carry 30,20 and 10 marks respectively. The questions may be in the form of multiple choices, fill-in-the-blank, supply the right word/choice, choose the right alternative, do as directed etc.

Unit-IV: 20 Marks

The question from this unit will test comprehension competence (in the form of various elements mentioned in the unit) of the text given.

(B) PRACTICAL (Presentation):

There will be an oral test carrying **20 marks**. The presentation part of the section i.e. Unit-V will be covered in this test. Hence, there is no need to include this unit in theory exam.

Three hours for a group of 15 students are required for this test. Test can be in the form of any of the activities mentioned in the Unit-V.

A panel of examiners appointed by the University will evaluate the presentation.

CH-451-E ENVIRONMENTAL SCIENCE & ENGINEERING
(Elective for EE,EL,ME,CSE & IT)

L T P		
4 - -	Sesstional	50 marks
	Theory	100 marks
	Total	150 marks

Environment & Ecology :
Introduction, component of environment, factors affecting environment objectives of environment management, segments of environment, atmosphere lithosphere, hydrosphere, biosphere, environmental pollution, classification of pollutants, types of pollutants. Ecology - Principle of ecology, environment and eco-factors (Medium & Biotic), Types of eco-system, ecological pyramids, Biogeochemical cycles in environment (sulphur cycle, phosphorus cycle, oxygen cycle, hydrological cycle-H cycle, Nitrogen cycle).

Waste Water & Its treatment processes :

Waste-water characteristics, effluent standards, primary treatment, secondary treatment – aerobic (activated sludge, aerated lagoons, trickling filter, roughing filter, rotating biological contactor) anaerobic (contact process, UASB)

Air pollution :
Classification of air pollutants
Particulates: Physical characteristics, mode of formation, settling properties, Control measures
Hydrocarbons: Nature, sources, control
Carbon Monoxide: Source, harmful effects on human health, control measures.
Oxides of Sulphur and Nitrogen : Sources, effects on human health and plants, control measures.
Solid Waste: Types, sources and properties of solid waste, solid waste management – Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

BOOKS SUGGESTED:

1. Environmental Engg: by Howard S. Peavy & others, MGH International
2. Metcaf - EDDY-Waste-water engineering revised by George Teholonobus (TMH)
3. Environmental Chemistry by B.K.Sharma, Goel Publishing , Meerut.
4. Environmental Chemistry, A.K.DE, Wiley Eastern.

Note: Eight questions will be set and students will be required to attempt five questions in all.

IT-471 E **Management Information System**

L	T	P	Class Work: 50
4	-	-	Exam: 100
			Total: 150
			Duration of Exam: 3 Hrs.

Unit-1: Foundation of Information System: Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, MIS organization within company, Management information and the systems approach.

Unit-2: Information Technology: A manager's overview, managerial overviews, computer hardware & software, , DBMS, RDBMS and Telecommunication.

Unit-3: Conceptual system design: Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, prepare the conceptual design report.

Unit-4: Detailed system design: Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, document the detailed design revisit the manager user.

Unit-5: Implementation evaluation and maintenance of the MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development .

Unit-6: Advanced Concepts in Information Systems: Enterprise Resources Management(ERP)**, S**upply Chain Management, C R M , Procurement Management System.

Text Books:

- Management Information System by W. S. Jawadekar, 2002, Tata McGraw Hill.
- Information System for Modern Management (3rd edition)- Robert G. Murdick, Loel E. Ross & James R. Claggett. PHI

Reference books:

- Management Information System; O Brian; TMH
- Management Information System by Davis Olson Mac Graw Hill
- Management Information System by Stasllings,(Maxwell Mc Millman Publishers)
- Information System; a Management Perspective; Alter Addison Wesley
- Introduction to Information System; McGraw Hill

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

IC-451-E **INTELLIGENT INSTRUMENTATION**

L	T	P
4	-	-

Theory	: 100 marks
Class Work	: 50 marks
Total	: 150 marks
Duration of exam.	: 3 hours

UNIT 1. INTRODUCTION:
Definition of an intelligent instrumentation system; feature of intelligent instrumentation ; components of intelligent instrumentation; Block diagram of an intelligent instrumentation.

UNIT 2. INTERFACING INSTRUMENTS & COMPUTERS:
Basic issue of interfacing; Address decoding; Data transfer control; A/D converter; D/A converter; Other interface consideration.

UNIT 3. INSTRUMENTATION/ COMPUTER NETWORKS:
Serial & parallel interfaces; Serial communication lines; Parallel data bus; EEE 488bus; Local area networks(LANs) : Star networks, Ring &bus networks, Fiber optic distributed networks, Field bus; Communication Protocols for very large systems: communication network rationalization.

UNIT 4. SOFTWARE FILTERS :
Description of Spike Filter, Low pass filter, High pass filter etc.

TEXT BOOK:
1. Principles of measurement & Instrumentation: Alan S. Moris ; PHI

NOTE: 8 questions are to be set –at least one from each unit. Students have to attempt any five questions.

EE-403-E **MULTIMEDIA SYSTEMS**

L T P		
3 1 0	CLASS WORK	: 50
	EXAM	: 100
	TOTAL	: 150
	DURATION OF EXAM:	3 HRS

UNIT-1 BASICS OF MULTIMEDIA TECHNOLOGY:
Computers, communication and entertainment; multimedia an introduction; framework for multimedia systems; multimedia devices; CD- Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; LANs and multimedia; internet, World Wide Web & multimedia distribution network-ATM & ADSL; multimedia servers & databases; vector graphics; 3D graphics programs; animation techniques; shading; anti aliasing; morphing; video on demand.

UNIT-2 IMAGE COMPRESSION & STANDARDS:
Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

UNIT-3 AUDIO & VIDEO:
Digital representation of sound; time domain sampled representation; method of encoding the analog signals; subband coding; fourier method; transmission of digital sound; digital audio signal processing; stereophonic & quadraphonic signal processing; editing sampled sound; MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; audio synthesis; musical instrument digital interface; digital video and image compression; MPEG motion video compression standard; DVI technology; time base media representation and delivery.

UNIT-4 VIRTUAL REALITY:
Applications of multimedia, intelligent multimedia system, desktop virtual reality, VR operating system, virtual environment displays and orientation making; visually coupled system requirements; intelligent VR software systems. Applications of environment in various fields.

TEXT BOOKS:

1. Multimedia:An Introduction :Villamil and Molina; Mc Milan, 1997
2 Multimedia: Making it work (fifth edition) : Vaughan; TMH,1994

REFERENCE BOOKS:

1. Multimedia: Production, planning and delivery : Villamil and Molina; Que,1997
2. Multimedia on the PC: Sinclair; BPB
3. Multimedia in Action : James E Shuman; Wadsworth Publ., 1997
4. Multimedia in Practice : Jeff coate Judith; PHI, 1995
5. Multimedia Systems : Koegel; AWL
6. Multimedia Making it Work : Vaughar; etl.
7. Multimedia Systems : John .F. Koegel; Buford,2001
8. Multimedia Communications by Halsall & Fred, AW, 2001
9. Lozano, multimedia: Sound and Video; PHI, 1997, (Que)

NOTE : Eight questions are to be set in all by the examiner taking at least one question from each unit. Students will be required to attempt five questions in all.

HUM-455-E **ENTREPRENEURSHIP**
VIITH SEMESTER (ELECTIVE)

L	T	P
3	1	-

Class Work : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam. : 3 Hrs.

UNIT-I : Promotion of Entrepreneurship

Meaning, definition and functions of an entrepreneur, qualities of a good entrepreneur; Role of Entrepreneur in economic development; Government measures for the promotion of small scale industries with special reference to Haryana; Cultural factors in developing entrepreneurship.

UNIT-II : Ownership and Location of Industrial Units

Different forms of Industrial Organisation.
Theories of Industrial location. Process of preparing project reports.

UNIT-III : Size of Firm and Pricing

Concept of optimum firm, factors determining
Optimum size. Technical, Managerial, Marketing Uncertainties and risk.
Pricing Methods, Policies and procedures.

UNIT-IV : Financing of Small Industries

Importance and need : Commercial Banks and term lending in India; Banks and under-writing of capital issues; Brief description about the role of other financial agencies viz; Industrial Finance Corporation of India. State Financial Corporation, Industrial Development Bank of India; Unit Trust of India.

UNIT-V : Problems Faced by Small Enterprises

Problems connected with Marketing, Management of New Products; Power; Finance; Raw Material; Under-utilization of capacity; Causes of under – utilization; Rehabilitation of Sick Mills.

UNIT-VI : Government and Business

(a) Highlights of Industrial Policy and Licensing Policy.
(b) International Marketing with special reference to export documentation.

Recommended Books :

1. Entrepreneurship of Small Scale Industries – Deshpande Manohar D. (Asian Publishers, New Delhi)
2. Environment and Entrepreneur – Tandon B.C. (Asian Publishers, New Delhi).
3. The Industrial Economy of India – Kuchhal S.C. (Chaitanya, Allahabad).
4. Emerging Trends in Entrepreneurship Development Theories & Practices – Singh P.Narendra (International

Founder, New Delhi)
5. Entrepreneur, Banker & Small Scale Industries – Bhattacharya Hrisnikes.
6. Entrepreneurship & Growth of Enterprise in Industrial Estates – Rao Gangadhara N.

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

MATH-451-E **COMBINATORICS AND GRAPH THEORY**
(ELECTIVE FOR CSE, IT)

L	T	P
4	-	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Unit-I :
Permutations and combinations, Recurrence relations, Generating functions, decision trees.

Unit-II :
Graphs, incidence and degree, isomorphism, subgraphs, walks, paths and circuits, connected graphs, Disconnected graphs and component Euler's graph, operations on graphs, Hamiltonian paths and circuits, Travelling salesman problem.

Unit-III :
Trees, properties of trees, Pendant vertices in tree, Rooted and binary trees, Spanning trees, Fundamental circuits, Spanning trees in a weighted graph.

Unit-IV :
Cut-sets, properties of cut-sets, Fundamental circuits and cut-sets, connectivity and separability, Network flows, 1-isomorphism and 2-isomerphism.

Unit-V :
Planer graphs, Kuratowski's two graphs, different representation of a planer graph, Detection of planarity, vector space of graph.

Unit-VI :
Matrix representation of graphs, incidence matrix, submatrix of incidence matrix, Fundamental circuit matrix, cut-set matrix and relationship between all three above.

Unit-VII :
Colouring, chromatic number, chromatic polynomials, four color problem, Five color theorem.

Unit-VIII :
Directed graphs and their types, Binary relation, Directed paths and connectedness, Euler's digraph.

Books Recommended :

1. Graph Theory by Narsingh Deo, P.H.I.
2. Graph Theory by Harry P., Addison-Wesley.

Note : Examiner will set eight questions, taking one from each unit. Students will be required to attempt any five questions.

HUM-453-E **ORAL COMMUNICATION COMPETENCE**
SEMESTER VII (ELECTIVE)

L	T	P
4	-	-

Class Work	: 50 Marks
Theory	: 60 Marks
Practical/Presentation	: 40 Marks
Total	: 150 Marks
Duration of Exam	: 2 Hrs

Oral communication forms the major chunk of social and professional interaction. It is not only the 'what' but the 'how' of knowledge communication that assumes utmost importance once the professional students enter the job market. S/he has to be well-versed with the nuances and complexities, not only of every day oral interaction but also with the situation based oral competence. This course is designed with this need of the professional students in mind. It is also helpful to those students who appear for TOEFL and IELTS.

COURSE CONTENT:

Unit I

Oral Communication: Basic concepts, scope and significance.

UNIT II

Fundamental of Spoken English: Essentials of Good Speaking; Dialogues, Public Speaking and Formal Presentations.

Unit III

Listening Skills: Essentials of good listening; Listening for various purposes.

Unit IV

Reading Skills: Basic concepts; Reading for various purposes; Reading print and visual texts (Advertisements, Documentaries, Fiction/non-fiction, Movies).

UNIT V

Body language and Paralanguage: Gestures, postures, facial expressions, tone, pitch, rhythm etc.

UNIT VI:

Oral Skills for Specific Situations: Interviews, Meetings and Group Discussion.

SUGGESTED READING:

1. *Body Language* Sudha Publications pvt. Ltd.,Delhi.
2. *Body Language at Work* by A. Furnham, University Press (India) Limited, Hyderabad.
3. *Listening Skills* by I. MacKay, University Press (India) Limited, Hyderabad.
4. *Presentation Skills* by S. Siddons, University Press (India) Limited, Hyderabad.
5. *Effective Presentation* by A. jay and R.Jay, University Press (India) Limited, Hyderabad.
6. *Reading Between the Lines* by McRae, Foundation Books (Cambridge University Press), New Delhi.
7. *Better English Pronunciation* by J.D.O.'Connor, Cambridge Univ. Press.,London.
8. *Cambridge practice Tests for IELTS 1 Book with 2 Cassettes* by Jakeman, Foundation Books (Cambridge University Press), New Delhi.
9. *Cambridge Preparation for the TOEFL Test* by Gear, Foundation Books (Cambridge University Press), New Delhi.
10. *Group Discussions/Interviews at a Glance*, Sudha Publications pvt. Ltd.,Delhi

SCHEME OF EXAMINATION:

(A) THEORETICAL: 60 marks

There will be five questions of 20 marks each covering all the units **except unit V.** The students are required to attempt any three questions. The questions may be set on the theory part of the elements from the units or students may be given some mock situations to be worked on. For the unit on Reading Skills, they may be given a manageable short text to be reviewed, summarised or to be analysed.

(B) PRACTICAL: 40 Marks

There will be an oral test to evaluate the spoken skills of the students. Besides evaluating clarity, fluency and spontaneity of the language, this test will look for how well the components of body language and para-language are integrated with the linguistic means. The students may be evaluated through presentation/mock-meeting or Group Discussion. Also they can be asked to face interviews in mock Situations. The time duration for this exam for every batch of 15 students will be of 3 hrs.

A panel of examiners appointed by the University will evaluate the oral competence of the students.

MATH-455-E **LINEAR ALGEBRA**
(ELECTIVE FOR CSE,IT)

L	T	P
4	-	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Unit-I & II :

Sets and examples of sets, operations on sets, relations, functions, binary operations, algebraic structures, operations on functions.

Unit-III & IV :

Vector spaces and their examples, subspaces, span of a set, linear dependence, linear independence, dimension and basis.

Unit-V :

Definition and examples of a linear transformation, range and kernel of a linear map, rank and nullity.

Unit-VI :

Inverse of a linear transformation, consequences of Rank nullity theorem, space L(U,V), composition of linear maps, operator equations.

Unit-VII :

Matrix associated with a linear map, linear map associated with a matrix, linear operations in Mm,n matrix multiplication, rank and nullity of a matrix.

Unit-VIII :

Transpose of a matrix and special types of matrices, elementary row operations, system of linear equations, matrix inversion.

Books Recommended :

1. An Introduction to Linear algebra by V. Krishnamurti et.al (EWP).
2. Linear Algebra by Hoffman & Kunze (PHI).

Note : Examiner will set eight questions, taking one from each unit. Students will be required to attempt any five questions.

PHY-451-E NON CONVENTIONAL ENERGY & CONVERSION TECHNOLOGY
(Elective for EE,EL,ME,CHE)

L T P			
4 - -	Class Work	:	50 Marks
	Exam.	:	100 Marks
	Total	:	150 Marks
	Duration of Exam.	:	3 Hours.

ENERGY SITUATION AND RENEWABLE ENERGY SOURCES :

Global energy scene, Indian Energy scene, Non Conventional renewable energy sources, potential of renewable energy sources.

SOLAR THERMAL POWER GENERATION :

Thermal and direct electricity generation, Major Sub systems of solar-thermal power plants, examples of installed systems, Concentration ratio, temperature and efficiency, Solar farm concept.

PHOTOVOLTAIC ENERGY CONVERSION :

Introduction, Fundamentals, Solar Cell Modules, Silicon Solar Cells, Copper Sulphide/Cadmium Sulphide Solar Cells, other materials.

WIND ENERGY :

Introduction, Original of wind and general circulation system of earth, variables in wind energy system, wind turbine efficiency, power of a wind turbine for given incoming wind velocity.

HYROGEN ENERGY :

Introduction, Applications of Hydrogen, production of hydrogen, storage & its utilization.

WAVE, TIDAL & OTEC :

Introduction, wave energy, Tidal energy, Ocean thermal energy conversion (OTEC).

ENERGY STRATEGIES :

Energy Management and energy conversion measures.

RECOMMENDED BOOKS :

1. Renewable energy sources & conversion technology – N.K. Bansal, M.Kleemann & Melis.
2. Energy Technology – S.Rao & B.B. Panenlekar.

Note : Eight questions will be set and students will be required to attempt any five questions in all. All questions will carry equal marks.

HUM-457-E ORGANISATIONAL BEHAVIOUR & HUMAN RESOURCE MANAGEMENT
VIITH SEMESTER (ELECTIVE)

L	T	P
4	-	-

Class Work : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam .: 3 Hrs.

Unit-I : Understanding Organisational Behaviour

Definition, Goals of Organisational behaviour. Key forces affecting Organisational Behaviour. Fundamental Concepts of Organisational Behaviour.

Unit-II : Motivation

Meaning, Objectives and importance of motivation. Theories of Motivation, Maslow's theory, Mc Greger's Theory Herzberg's theory.

Morale : Meaning; Factors affecting morale, types of morale morale and productivity, Evaluation of morale, improving morale.

Unit-III : Communication

Definition & importance of Communcation; Formal & informal communication, Barriers in communication.

Unit-IV : Leadership

Definition & importance, Nature of leadership various approaches to leadership styles.

Unit-V

Importance of human resources in industry, Definition of human resource management, mechanical approach towards personnel, Paternalism, Social system approach.

Unit-VI

Need for human resource planning, process of human resource planning, Methods of recruitment, Psychological tests and interviewing, Meaning and importance of placement, Meaning and techniques of induction. Training and development : Concepts of training and development, Importance of training and development, Management development its nature, purpose and method.

Unit-VII

Significant factors affecting compensation, Methods of wage payment, Wage differentials, Causes of difference in Wages, Types of wage differentials, Wage incentives, Meaning, Objectives, types of incentive plans.

Recommended Books :

Text Books :

1. Human Resource and Personnel Management – K. Aswathappa – Tata McGraw Hill Publishing Company Ltd.
2. Personnel Management : C.B. Mamoria, Himalaya Publishing House.
3. Organisational Behaviour – Dr. L.M. Prasad (Sultan Chand & Sons).

Reference Books :

1. Personnel Management & Industrial Relations : Dr. T.N. Bhagoliwal : Sahitya Bhawan Agra.
2. Personnel Management : V.G. Karnik, Jaico Publishing House.
3. Personnel management & Industrial Relation: Tripathi: Sultan Chand & Sons.
4. Personnel Management – Arun Monappa & Mirza Saiyadain – Tata McGraw Hill Publishing Co. Ltd.
5. Personnel Management and Industrial Relations – D.C. Sharma & R.C. Sharma S.J. Publications.
6. Principles of Personnel Management – Edwin B. Flippo (McGraw Hill).
7. Organisational Behaviour – K. Adwathappa.
8. Organizational Behaviour – John W. Newsstorn & Keith Davis, Tata McGraw - Hill Publishing Company Limited, New Delhi.

Note: Eight questions are to be set at least one question from each unit and the students will have to attempt five questions in all.

CSE-403 E **Software Project Management**

L	T	P	
3	1	-	Class Work: 50 Exam: 100 Total: 150 Duration of Exam: 3 Hrs.

Unit-1: Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Unit-2: Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

Unit-3: Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral-models. Prototyping, delivery. Albrecht function point analysis.

Unit-4: Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks.

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values..

Unit-5: Resource allocation &Monitoring the control: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

Unit-6: Managing contracts and people: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises..

Unit-7: Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.

Unit-8: Study of Any Software Project Management software: viz Project 2000 or equivalent

Text Book:

- Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

Reference Books:

- Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
- Software Project Management, Walker Royce, 1998, Addison Wesley.
- Project Management 2/c. Maylor
- Managing Global software Projects, Ramesh, 2001, TMH.

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

IC- 453- E **OPTIMAL CONTROL**

L	T	P
4	-	-

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam.: 3 hours

UNIT I CONTROLLABILITY:
Definition of Controllability, Controllability of linear line in variance system, Controllability of time varying linear system.

UNIT II RECONSTRUCTIONABILITY:
Definition of Re-constructionability, Reconstructionbility of linear time invariant systems, Reconstructionbility of time varying linear systems.

UNIT III OPTIMAL LINEAR STATE FEEDBACK CONTROL SYSTEM:
Introduction, Stability improvement of linear systems of state feedback, Linear state feedback control, Conditions for Pole assignment and stabilization .The deterministic linear optimal regulator problem, Solution of Regulator problem, Derivation of the Riccati equation

UNIT IV SEADY STATE SOLUTION OF DERMINISTIC LINEAR OPTIMAL REGULATOR PROBLEM:
Introduction and summary of main results, Steady state properties of optimal regulators, Steady state properties of the time in variance optimal regulator, Solution of the time-invariant regulator problem by Diagonalization.

UNIT V NUMERICAL SOLUTION OF RICCATI EQUATION:
Direct integration, The kalman-Englar-Method, Solution by Diagonalized, Solution by Newton – Raphson method., Stochastic Linear Optimal Method & Tracking problems

UNIT VI REGULATOR PROBLEM WITH DISTURBANCES:
The stochastic regulator problem, Stochastic tracking problems, Solution of the stochastic linear optimal regulator problem, Optimal Linear Reconstruction of state, Introduction, Observers: Full observes, Reduced order observe

UNIT VII OPTIMAL LINEAR OUTPUT FEEDBACK CONTROL SYSTEMS:
Introduction, Regulation of linear systems with incomplete measurements, Linear optimal control theory for discrete tuning systems.

UNIT VIII THE DESIGN OF TIME OPTIMAL SYSTEMS:
The design of fuel-optimal systems, The design of optimal linear system with quadratic criteria,

TEXT BOOKS:

1. Optimal Control : Huibert KwakernaAK AND Raphael Sivan ; Wiley Intascienceta division of John Wiley and Sons, Inc.
2. Michel Althaus & Petu L.Fab ; Mc-Graw Hill Book Comp.

NOTE: 8 questions are to be set –at least one from each unit. Students have to attempt any five Questions.

MATH-402-E **OPERATIONS RESEARCH**
(Compulsory for Chemical Engg.
Elective for CSE,IT,EE,EL)

L	T	P
3	1	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Unit-I :

The origin of OR, Phases of an O.R. study, Impact of OR, Formulation of Linear-programming model, Graphical solution. Converting the linear programming problem to standard form, Simplex method.

Unit-II :

Big-M method, Two-Phase method, Degeneracy, Alternate optima, unbounded and infeasible solution.

Unit-III :

Definition of the dual problem, primal-dual relationship, Dual Simplex method, Postoptimal and sensitivity analysis.

Unit-IV & V :

Assignment problem and its mathematical formulation, solution of assignment problem (Hyngarian method), Transportation problem and its mathematical formulation, Initial basic feasible solution of transportation problem by North-West corner rule, Lowest-Cost Entry method and Vogel's Approximation method, Optimal solution of transportation problem.

Unit-VI :

Network models, Minimal spanning tree algorithm, Shortest-route problem (Floyd's Algorithm and Dijkstras algoritham), Maximal flow problem, Introduction to CPM & PERT.

Unit-VII :

Introduction to Dynamic Programming, General inventory Model, Static Economic Order Quantity (EOQ) Models.

Unit-VIII :

Elements of a Queuing model, Pure Birth & Death model, Generalized Poisson Queuing model, Specialized Poisson Queues.

Books Recommended :

1. Operations Research by Hamdy A. Taha.
2. Introduction to Operations Research by Hiller and Dieherman, TMH.
3. Optimization Theory and Application : S.S. Rao, John Wiley.

Note : Examiner will set eight questions, taking one from each unit. Students will be required to attempt any five questions.

ME- 484 E ROBOTICS ENGINEERING

L	T	P		
3	1	-	Sessional	: 50 Marks
			Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hrs.

Unit I Robotic Manipulation: Automation and Robots; Robot Classification – Drive Technologies, Work-Envelope Geometries, Motion Control Methods, Applications; Robot Specifications – No. of Axes, Capacity and Speed, Reach and Stroke, Tool Orientation, Repeatability, Precision, Accuracy, Operating Environment, An Example; Rhino X-3.

Unit II Direct Kinematics: The Arm Equation Homogenous Co-ordinates – Frames, Translations and Rotations, Composite Homogenous Transformations; Screw Transformations; Link Co-ordinates; The Arm Equation; A Five-Axis Articulated Robot; A Four-Axis Scara Robot; A Six-Axis Articulated Robot; Problems.

Unit III Inverse Kinematics: Solving the Arm Equation: The Inverse Kinematics Problem; General Properties of Solutions; Tool Configuration; Inverse Kinematics of a Five-Axis Articulated Robot, Four-Axis Scara Robot, Six-Axis Articulated Robot and Three-Axis Planer Articulated Robot; A Robotic Work Cell; Problems.

Unit IV Work Space Analysis and Trajectory Planning : Work Space Analysis; Work Envelope of a Five-Axis Articulated Robot; Work Envelope of a Four Axis Scrara Robot; Work Space Fixtures; The Pick and Place Operation; Continuous Path Motion; Interpolated Motion; Straight Line Motion; Problems.

Unit V Differential Motion and Statics : The Tool Configuration Jacobian Matrix; Joint – Space Singularties; Generalised Inverses; Resolved – Motion Rate Control; n > 6; Rate Control of Reduntant Rebots : n > 6; Rate Control using (1) – Inverses; The Manipulator Jacobian; Induced Joint Torques and Forces; Problems.

Unit VI Manipulator Dynamics : Lagrange's Equation; Kinetic & Potential Energy; Generalised Force; Lagrange – Euler Dynamic Model; Dynamic Models of a Two-Axis Planer Articulated Robot and A Three-Axis SCARA Robot; Direct & Inverse Dynamics; Recuresive Newton - Euler Formulation; Dynamic Model of a One-Axis Robot; Problems.

Unit VII Robot Control : The Control Problems; State Equations; Constant Solutions; Linear Feedback Systems; Single-Axis PID Control; PD-Gravity Control; Computed –Torque Control; Variable-structure Control; Impedance Control; Problems.

Text Books:

1. Fundamental of Robotics (Analysis & Control) by Robert J.Schilling, Published by PHI, Pvt. Ltd., New Delhi.
2. Introduction to Robotics (Mechanics & Control) by John J. Craig, Published by Addition Wesley (Intl. Student Edition).

Reference Books:

1. Analysical Robotics & Mechatronics by Wolfram Stadler, Published by Mc-Graw Hill, Inc., New Delhi.

2. Industrial Robotics - Technology, Programming & Applications by Mikell P. Grover, Weiss, Nagel and Ordef , Published by Mc-Graw Hill International Edition.
3. A Robot Engg. Test Book - Mohsen Shahinpoor, Harper & Low, Publishing New York.
4. Robotic Engineering – An Integrated Approach : Richard D.Klafter, Thomas A. Chmielewski and Michael Negin PHI 1989.
5. Foundations of Robotics Analysis and Control - Tsuneo Yashikawa MIT Press 1990, Indian Reprint 1998.
6. Robots and Control - R.K.Mittal and I.J.Nagrath - Tata McGraw Hill 2003.

Note: In the semester examination, the examiner will set eight questions, at least one question from each unit. The students will be required to attempt only 5 questions.

CSE-304 E **Intelligent Systems**

L	T	P	Class Work: 50
3	1	-	Exam: 100
			Total: 150
			Duration of Exam: 3 Hrs.

Unit-1: Foundational issues in intelligent systems: Foundation and history of AI, Ai problems and techniques **–** AI programming languages, introduction to LISP and PROLOG- problem spaces and searches, blind search strategies, Breadth first- Depth first- heuristic search techniques Hill climbing: best first- A * algorithm AO* algorithm- game tree, Min max algorithms, game playing- alpha beta pruning.

Unit-2: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems.

Unit-3: Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and Dempster shafer theory, Heuristic methods, symbolic reasoning under uncertainty, Statistical reasoning, Fuzzy reasoning, Temporal reasoning, Non monotonic reasoning.

Unit-4: Planning, planning in situational calculus, representation for planning, partial order planning algorithm, learning from examples, discovery as learning, I earning by analogy, explanation based learning, neural nets, genetic algorithms.

Unit-5: Principles of Natural language processing, rule based systems architecture, Expert systems, knowledge acquisition concepts, AI application to robotics, and current trends in intelligent systems.

Text Book:

- Artificial Intelligence: A Modern Approach,. Russell & Norvig. 1995, Prentice Hall.

Reference Books:

- Artificial Intelligence, Elain Rich and Kevin Knight, 1991, TMH.
- Artificial Intelligence-A modern approach, Staurt Russel and peter norvig, 1998, PHI.
- Artificial intelligence, Patrick Henry Winston:, 1992, Addition Wesley 3rd Ed.,

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

PHY-452-E **LASER TECHNOLOGY**
(Elective for EE,EL,CSE,IT,IC)

L	T	P
4	-	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of Exam.	:	3 Hours.

Conditions for Producing Laser, Concept of coherence – Special and temporal,Population Inversions, Einstein coefficient, Gain and Gain saturation, Saturation intensity, Development and Growth of a Laser Beam, Exponential Growth factor, Threshold Requirement for a Laser.

Inversions and two-level systems, steady-state inversions and three and four-level systems. Transient Population Inversions, Factors effecting population inversion, Laser Amplifiers.

Excitation or Pumping Threshold Requirements, Pumping Pathways, Specific Excitation Parameters Associated with Optical and particle Pumping.

Helium-Neon Laser, Co_2 Laser, Ruby Laser, Semiconductor Diode Laser.

RECOMMENDED BOOKS:

1. Laser Fundamentals by William T. Silfvast Cambridge University, Press.
2. Introductory University Optics by John Beynon, (PHI)
3. Laser – B.B. Laud.
4. Optics – A.K. Ghatak (TMH)

Note : Eight questions will be set and students will be required to attempt any five questions in all. All questions will carry equal marks.

CSE-202 E **Database Management Systems**

L	T	P	Class Work: 50
3	1	-	Exam: 100
			Total: 150
			Duration of Exam: 3 Hrs.

Unit–1:Introduction Overview of database Management System; Various views of data, data Models, Introduction to Database Languages. Advantages of DBMS over file processing systems, Responsibility of Database Administrator,

Unit-2: Introduction to Client/Server architecture, Three levels architecture of Database Systems, E-R Diagram (Entity Relationship), mapping Constraints, Keys, Reduction of E-R diagram into tables.

Unit-3: File Organisation: Sequential Files, index sequential files, direct files, Hashing, B-trees Index files.

Unit-4: Relational Model, Relational Algebra & various operations, Relational and Tuple calculus.

Unit-5: Introduction to Query Languages :QLB , QBE, Structured query language **–** with special reference of (SQL of ORACLE), integrity constraints, functional dependencies & NORMALISATION **–** (up to 4^{th} Normal forms), BCNF (Boyce **–** code normal forms)

Unit-6: Introduction to Distributed Data processing, parallel Databases, data mining & data warehousing, network model & hierarchical model, Introduction to Concurrency control and Recovery systems.

Text Books:

- Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3^{rd} edition, 1997, McGraw-Hill, International Edition.
- Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Reference Books:

- Fundamentals of Database Systems by R. Elmasri and S.B. Navathe, 3^{rd} edition, 2000, Addision-Wesley, Low Priced Edition.
- An Introduction to Database Systems by C.J. Date, 7^{th} edition, Addison-Wesley, Low Priced Edition, 2000.
- Database Management and Design by G.W. Hansen and J.V. Hansen, 2^{nd} edition, 1999, Prentice-Hall of India, Eastern Economy Edition.
- Database Management Systems by A.K. Majumdar and P. Bhattacharyya, 5^{th} edition, 1999, Tata McGraw-Hill Publishing.
- A Guide to the SQL Standard, Date, C. and Darwen,H. 3rd edition, Reading, MA: 1994, Addison-Wesley.
- Data Management & file Structure by Looms, 1989, PHI

Note: Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

HUM-452-E **BUSINESS COMMUNICATION**
SEMESTER VIII (ELECTIVE)

L T P		
4 - -	Class Work	: 50 Marks
	Theory	: 100 Marks
	Total	: 150 Marks
	Duration of Exam	: 3 Hrs

The course proposes to help students develop business and technical communication competence. It focuses on writing skills and strategies for specific purposes. The inevitability of introducing this course to Engineering students is embodied in that it has comparatively a high concentration of certain complex writing techniques and procedures.

COURSE CONTENT:

Unit-I

Business correspondence: Characteristics and Formats of Business letter; Quotations, Orders, Tenders, Sales letters, claim and adjustment letters, Credit and Collection letters, Application Letters for vacant situations with emphasis on Resumes and Curriculum Vitae; E-mail and Netiquette – format, style and tone.

Unit-II

Business Reports and Proposals: Importance, Function, Pattern and formats of Reports, Typical Business Reports, Report Organisation and Presentation, and Formal Reports; Proposal Formats, Writing problem-Solving Proposals, Executive Summary Proposals and project Proposals.

Unit-III

Meetings: Writing of Memorandum, Notes, Agenda and Minutes of Meeting.

Unit-IV

Public Relations and Advertising Documents: Press Releases, Public Service Announcements, Advertising Strategy and its objective, Designing of Classified and Display Advertising copies.

SUGGESTED READING:

1. *Business Communication: Process & Product* by Hary Ellen Guffey, IV Edition, South-Western College Publishing, Cincinnati.

2. *Business Correspondence and Report Writing* by R.C. Sharma & Krishna Mohan, Tata Macgraw Hill Publication, New Delhi.

3. *Effective Business English and Correspondence* by M.S. Ramesh and C.C. Pattanshetti, R. Chand & Co., New Delhi.

4. *Effective Letters in Business by Robert* by C. Shruter, Tata Macgraw Hill, New Delhi.

5. *English Business Letters* by F.W. Wing & D. Anncree, Orient Longman.

6. *Written Communication in English* by Sarah Freeman, Orient Longman.

7. *International Business English* by Leo Jones & Richard Alexander, Cambridge University Press.

8. *General and Business English* by Sweet Stephen, Sir Issac Pitman & Sons Ltd., London.

9. How to Write and Present Technical Information, Charles H. Sides, Cambridge University Press, U.K.

10. Strategies for Engineering communication, Susan Stevenson/Steve Whitmore, John Wiley and Sons, Inc. Printed in India by Replika Press Pvt. Ltd., Delhi.

SCHEME OF EXAMINATION:

There will be six questions in all, covering all the units. All questions will be compulsory and will have enough internal choice.

Unit-I: 30 Marks

There will be two questions from this unit. One question will cover the theoretical aspect of business letter writing and will carry 10 marks. The other question will be on writing the letter in a proper format on a subject given and will be of 20 marks. There will be enough choice taking care of the justice to be given to both the aspects of the letter writing.

Unit-II: 35 Marks

There will be two questions from this unit. One question will cover the theoretical aspect of report/proposal writing and will carry 15 marks. The other question will be on preparing the report/proposal on a topic/subject given and will be of 20 marks. There will be enough choice taking care of the justice to be given to both the aspects of the report writing.

Unit-III: 15 Marks

There will be a question on theoretical aspects of the various items of this unit or students can be asked to draft a specimen of any of these from the material given in the exam. The question can be split into parts.

Unit-IV: 20 Marks

There will be one question having two parts. One part will be on theory and will be of 5marks and the other will require the drafting an advertisement copy of a product or service or a public announcement and will carry 15 marks.

HUM-454-E **INDIAN ENGLISH WRITING**
SEMESTER VIII (ELECTIVE)

L	T	P
4	-	-

Class Work	: 50 Marks
Theory	: 100 Marks
Total	: 150 Marks
Duration of Exam	: 3 Hrs

Technological skills, devoid of human values, tend to turn professionals into mere automatons. It is imperative to sensitise them to social and human values.
This course, through formal exposure to literature, aims at achieving this much-needed holistic balance.

COURSE CONTENT:

English August by Upamanyu Chatterjee
Seven Steps in the Sky by Kundanika Kapaadia
Fire and Rain by Girish Karnard
Countdown by Amitav Ghosh

TEXTS BOOKS:

1. *English August* by Upamanyu Chatterjee, Penguin Books, Delhi/Faber&Faber, Delhi.
2. *Seven Steps in the Sky by* Kundanika Kapaadia, Penguin Books, Delhi.
3. *Fire and Rain* by Girish Karnard, OUP, Delhi.
4. *Countdown* by Amitav Ghosh, Ravi Dayal, Delhi.

SCHEME OF EXAMINATION:

The students will be required to attempt five questions in all. All questions will carry equal marks. Question no 1 will be compulsory. It will have four 'reference to context' type questions covering all the texts. Here students' first hand reading of the texts will be tested.

Besides the first, there will be eight more questions (covering all the four texts) out of which the students will be required to attempt any four, choosing at least one question from each text. The questions will be so framed as to evaluate the knowledge of the text for various social, political, cultural and human issues from readers' point of view. No question will be based on literary theory.

HUM-456-E **MARKETING MANAGEMENT**
VIIITH SEMESTER (ELECTIVE)

L	T	P
4	-	-

Class Work : 50 Marks
Theory : 100 Marks
Total : 150 Marks
Duration of Exam.: 3 Hrs.

Unit-I

Definition of Marketing and Marketing Management-Nature, scope and importance of Marketing. The Evolution of concepts in Marketing- The Production concept, The Selling concept, The modern Marketing Concept. The Societal concept. The Marketing System.

Unit-II

Elements of marketing mix. Market segmentation-Meaning, importance and basis of market segmentation. Target marketing, market segmentation Vs target marketing.

Unit-III

Product-concepts and types. Product life cycle, New Product development and its process. Branding, packaging and trademark decisions.

Unit-IV

Pricing-Objectives and importance, strategies. Pricing practices and methods.

Unit-V

Distribution-Process of distribution, types, marketing channel decisions and their importance.

Unit-VI

Marketing Promotion-Meaning, Marketing communication, Advertising, Sales Promotion, Publicity-their concepts and relative importance. Selection of media. Salesmanship - importance, duties, responsibilities, Training & methods of training.

Unit-VII

Marketing Information System-Meaning, techniques and importance. Marketing Research-Meaning, Objective and its process.

Text Books :

1. Introduction to Marketing & Salesmanship - J.C. Sinha - R.Chandra & Co.
2. Modern Marketing management - C.J. George, K.C. Nair, J.John - Himalya Publishing House.
3. Modern Marketing Management - Rustam S. Dawar - Universal Book Stall.

Reference Books :

1. Modern Marketing - R.S.N. Pillai & V. Bagvati - S. Chandra & Co.
2. Marketing Management – Phlip Kotler – Prentice Hall of India Pvt. Ltd.
3. Marketing Management – T.N. Chhabra, S.K. Grover – Dhanpat Rai & Co.
4. Marketing Management – S.A. Sherlekar – Himalaya Publishing House, Bombay
5. Basic Marketing – Cundiff and Still – PHI India.

Note:Eight questions are to be set atleast one question from each unit and the students will have to attempt five questions in all.

MATH-454-E **ADVANCED MATHEMATICS**
(ELECTIVE FOR EE,EL)

L	T	P
4	-	-

Class Work : 50 Marks
Exam. : 100 Marks
Total : 150 Marks
Duration of exam : 3 Hours

Unit-I : Series solution of differential equations :
Series solution and its validity, General method, Forms of series solution.

Unit-II & III : Special Functions :
Bessel's equation, Recurrence formulae for Jn(x), Expansion for Jo and J1, Value of J1/2, Generating function for Jn(x), Orthogonality of Bessel function, Legendre's equation, Rodrigues formula, Legendre polynomials, Generating function for Pn(x), Recurrence formulae for Pn(x), Orthogonality of Legendre polynomials.

Unit-IV : Calculus of Variations :
Introduction, Euler's equation and its solution, Isoperimeteric problems, Approximate solution of boundary value problems by (a) Rayleigh Ritz method (b) Galerkin's method. The variations including more general case. Hamilton's Principle and formation of Hamilton's function.

Unit-V & VI : Integral Equations :
Definition, Conversion of a linear differential equation to an integral equation and vice versa, Conversion of boundary value problem to integral equations using Green's function, solution of an integral equation, Integro - equations of the convolution type, Abel's integral equation, Integral differential equations, Integral equation with separable Kernels, Solution of Fredholms and Volterra equations by the method of successive approximations.

Unit VII & VIII : Tensor Analysis :
Introduction, Summation, Convention, Transformation of coordinates, Tensor of order zero, Kronecker delta, Contravariant vector, covariant vectors, Tensors of higher order, symmetric and skew symmetric tensors, Inner product of two tensors, Quotient law, Riemannian Space, Metric tensor, Conjugate tensor, Associated tensors, Length of a vector, Angle between two vectors, Christoffel symbols, Transformation of Christoffel symbols, Covariant differentiation of a covariant vector, Covariant differentiation of a contravariant vector, Gradient, divergence, curl.

Books Recommended :
1. Advanced Engineering Mathematics – F. Kreyszig.
2. Higher Engineering Mathematics : B.S. Grewal.

Note : Examiner will set eight questions, taking one from each unit. Students will be required to attempt any fi questions.

IC- 458-E RANDOM PROCESSES IN CONTROL AND ESTIMATION

L	T	P
4	-	-

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam : 3 hours

Introduction to random variables and random processes. Eiener;s theory of optimization. Application of Wiener,s theory in the compensator design for feedback control systems. Gauss Markov model for vector random processes. Kalman filtering and prediction for discrete time and continuous time sytems. Minimum variance control.

TEXT BOOKS:

1. Stochastic optimal linear estimation and Control : J.S.Meditch
2. Compensator Design for Stochastic Processor : Newton, Kaser and Gould

NOTE: 8 questions are to be set. Students have to attempt any five Questions.

IC- 460-E PARAMETER ESTIMATION AND SYSTEM IDENTIFICATION

L	T	P
4	-	-

Theory : 100
Class work : 50
Total : 150
Duration of exam.: 3 hours

UNIT 1. INTRODUCTION:
Review of stochastic process, Models and model classification, the identification problem, some fields of applications. Classical methods of identification of impulse response and transfer function models, model learning techniques.

UNIT 2. IDENTIFICATION:
Linear least square estimator, properties of l.s.e., generalised and weighted least square and instrumental variable method.

UNIT 3. ON-LINE IDENTIFICATION:
Deterministic gradient algorithm, recursive least squares, minimum variance algorithm, stochastic gradient approximation method and maximum likelihood method. Simultaneous state and parameter estimation extended Kalman filter, two stage identification methods.

UNIT 4. NON-LINEAR IDENTIFICATION:
Quasi-linearisation, invariant imbedding, numerical identification methods.

TEXT BOOKS:
1. Discrete Techniques of Parameter Estimation : Jerry M. Mendal, ; Marcel Dekker
2. System Identification : Eykhoff

NOTE: 8 questions are to be set –at least one from each unit. Students have to attempt any five Questions.

IC- 462-E **ADAPTIVE CONTROL**

L	T	P
4	-	-

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam.: 3 hours

UNIT 1. WHAT IS ADAPTIVE CONTROL:
Introduction, Adaptive Schemes, Adaptive Control Theory, Application, Conclusion.

UNIT 2. WHY ADAPTIVE CONTROL:
Introduction, When is constant-gain feedback insufficient?, Robust Control, The Adaptive Control Problem, Conclusion.

UNIT 3. REAL TIME PARAMETER ESTIMATION:
Introduction, Least squares & regression models, Estimating parameters in Dynamical systems, Experimental conditions, Properties of Recursive estimators, Implementation Issues, Conclusions.

UNIT 4. MODEL-REFERENCE ADAPTIVE SYSTEMS:
Introduction, The MRAS problem, The Gradient approach, MRAS based on stability theory, Direct MRAS for General linear systems, MRAS for partially known system, Conclusions.

UNIT 5. SELF TUNING REGULATION:
The basic idea, Indirect self tuning regulators, Direct self tuning regulators, Unification of direct self-tuning regulators, Linear quadratic STRs, Adaptive Predictive Control, A priori knowledge in STR, Conclusion.

UNIT 6. STABILITY, CONVERGENCE & ROBUSTNESS:
Introduction, Global stability, Convergence, Averaging, An example of Averaging analysis, Robustness, Stochastic averaging, Parameterization, Instability mechanism, Universal stabilizers, Conclusions.

UNIT 7. STOCHASTIC ADAPTIVE CONTROL:
Introduction, Problem formulation, Dual Control, Sub-optimal strategies, Examples, Conclusions.

UNIT 8. AUTO TUNING:
Introduction, PID Control, Transient Response Methods, Methods based on Relay feedback, Conclusions.

TEXT BOOK:
1. Adaptive control : Kail Johan Astron & Bjorn Witten marks ; Wesley Publishing Company

REFERENCE BOOK :
1. Adaptive Control : Shankar Sastry & Marc Bodson ; PHI

NOTE: 8 questions are to be set **–** one from each unit. Students have to attempt any five Questions.

EE-406-E **ADVANCED CONTROL SYSTEMS**

L T P		
3 1 -	Theory	:100 marks
	Class work	:50 marks
	Total	:150 marks
	Duration of exam.	: 3 hours

1. STATE VARIABLE TECHNIQUES: State variable representation of systems by various methods. Solution of state equations-state transition matrix. Transfer function from state variable model. Controllability & observability of state variable model.
2. SECOND ORDER SYSTEMS & STATE PLANE: Phase portrait of linear second systems. Method of isoclines, phase portrait of second order system with non-linearities, limit cycle, singular points.
3. DESCRIBING FUNCTION ANALYSIS: Definition, limitations, use of describing function for stability analysis , describing function of ideal relay, relay with hysteresis & dead zone, saturation/coulomb friction & backlash,
4. LINEAR APPROXIMATION OF NONLINEAR SYSTEMS: Taylor series, Liapunov's 2^{nd} method.
5. SAMPLED DATA SYSTEMS: Sampling process, impulse modulation, mathematical analysis of sampling process, application of Laplace transform, Shannon's theorem, reconstruction of sampled signal, zero order & first order hold, Z-transform, definition, evaluation of Z-transform, Inverse Z-transform, pulse transfer function, limitations of Z-transform, state variable formulation of discrete time systems. Solution of discrete time state equations, stability, definition, Schur-Cohn stability criterion, Jury's test of stability, Extension of Routh-Hurwitz criterion to discrete time systems.

TEXT BOOKS:

1. M.Gopal: Digital Control & State Variable Methods, TMH.

REFERENCE BOOKS:

1. M. Gopal: Modern Control Theory, Wiley International.
2. K. Ogata: Discrete time control system, PHI
3. B.C. Kuo: Digital Control Systems.
4. J.E.Slotine & W.P.Li: Applied non-linear control, Prentice Hall, USA,
5. Isodori: Nonlinear Control Systems, Pub. , Springer-Verlag.

Note: 8 questions are to be set –one from each unit. Students have to attempt five questions.

MATH-452-E **STATISTICAL QUALITY CONTROL**
(ELECTIVE FOR EE,EL,CHE)

L	T	P
4	-	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Unit-I :

The Hypergometric, Binomial Poisson and normal distributions. The normal approximations to the Hypergeometric, Possion and Binomial distributions.

Unit-II :

Sampling from a normal distribution. Point estimation, Interval estimation. Tests on means of a normal population (i) variance known (ii) variance unknown.

Unit-III :

Chance and assignable causes of quality variation, Process Capability Estimation, Statistical basis of the control charts. Control charts for fraction non conforming. Control charts for non conformities.

Unit-IV :

Control charts for variables; X and R Control charts, X and S control charts.

Unit-V & VI :

The acceptance-sampling problem. Advantages and disadvantages of sampling. Types of sampling plans. Single-sampling plans for attributes. The OC curve. Designing of a single-sampling plan with a specified OC curves. Rectifying inspection.

Unit-VII :

Double sampling plans, the OC curve, the average sample number curve, Designing the double sampling plans with specified p_1, 1-□. p_2 and □, Rectifying inspection.

Unit-VIII :

Multiple-sampling plans. Sequential-sampling plans. OC and average sample number functions for the sequential-sampling plans.

Books Recommended :

1. Introduction to Statistical Quality Control : Douglas C. Montgomery John Wiley & Sons.
2. Fundamental of Applied Statistics by Gupta S.C. & Kapoor V.K. Sultan Chand & Sons.
3. Statistical Quality Control : Eugene L. Grant & Richard S. Leavenworth T.M.H. Edition.

Note : Examiner will set eight questions, taking one from each unit. Students will be required to attempt any five questions.

EE- 464-E PRINCIPLES OF COMMUNICATION ENGINEERING

L	T	P
3	1	-

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam. : 3 hours

UNIT 1. INTRODUCTION TO COMMUNICATION SYSTEM:
Block diagram with brief description to each block viz. Information, Transmitter, Channel, Receiver, Importance of Modulation .

UNIT 2. AMPLITUDE MODULATION:
Frequency Spectrum, Representation, Power Relation, Modulation & Demodulation Techniques.

UNIT 3. FREQUENCY MODULATION:
Frequency Spectrum, Representation, Modulation & Demodulation Techniques.

UNIT 4. PULSE MODULATION:
PWM, PPM, PCM, Delta Modulation.

UNIT 5. NOISE:
Various types of noise, Sources, General Description, Noise Figure, Noise Temperature, Performance of AM & FM in noise.

UNIT 6. INFORMATION THEORY:
Concept of information, Channel Capacity, Coding Theory, Transmission Rate & Capacity of Continuous Channel.

UNIT 7. OPTICAL COMMUNICATION:
The economic merits of Optical Fiber Systems, Optical Fiber Digital Telecommunication Systems, Analogue Systems, Applications in Local Data Communication Systems.

UNIT 8. RADAR & SATELLITE COMMUNICATION:
Principles & Block Diagram of Pulse Radar, CW Radar, MTI Radar, Noise & Clutter, Introduction to Satellite Communication Systems.

TEXT BOOK:

1. Electronic Communication Systems : George Kennedy ; TMH

REFERENCE BOOKS:

1. Introduction to Radar Systems: M.I.Skolanik ; MGH
2. Communication Systems: Simon Haykin ; John Wiley.
3. Introduction to Modern Communication Theory : P.D.Sharma
4. Introduction to Information Theory: F.M. Roze

NOTE: 8 questions are to be set –one from each unit. Students have to attempt any five questions.

EE- 466-E UTILIZATION OF ELECTRIC POWER AND TRACTION

L	T	P
4	-	-

Theory marks	: 100 marks
Class work	: 50 marks
Total marks	: 150marks
Duration of exam.	: 3 hours

UNIT 1. ILLUMINATION:
Basic laws of illumination, light sources and their characteristics, sources of light, design of lighting schemes, incandescent lamp, sodium lamp, mercury lamp and fluorescent lamp, comparison of various lamps.

UNIT 2. ELECTRIC HEATING :
Principle and application of resistance, induction and dielectric heating.

UNIT 3. ELECTRIC WELDING :
Resistance welding, arc welding, welding generator and welding transformer, properties of arcing electrode.

UNIT 4. ELECTROLYTIC PROCESS:
Principles and applications of electrolysis. Faraday's law of electrolysis, electroplating, charging and discharging. Capacity and efficiency of battery, defects in battery.

UNIT 5. ELECTRIC TRACTION:
Advantages of electric traction, requirements of an ideal traction system, train movement, mechanism of train movement, traction motors, traction motor control, multi unit control, braking of electric motors, thyristor control of electric traction.

REFERENCE BOOKS :
1. Utilization of Electrical Energy : Open Shaw Taylor ; ELBS
2. Art and Science of Utilization of Electrical Energy : H. Pratab ; Dhanpat Rai & Sons, Delhi.
3. Generation, Distribution and Utilization of Electrical Power : C.L. Wadhwa ; Khanna Pub.

NOTE: 8 questions are to be set **–** at least one from each unit. Students have to attempt any five questions.

IC-464-E **DYNAMIC BEHAVIOUR OF PROCESES**

L	T	P
4	-	

Theory	:	100 marks
Class work	:	50 marks
Total	:	150 marks
Duration of exam.	:	3 hours

UNIT 1. INTRODUCTION TO DYMAMICS:
A Perspective, The Unsteady State, The Quasi-Steady State, Static versus Dynamic Behavior.

UNIT 2. PROCESS MODELS:
Macroscopic and Microscopic Conservation Laws, Flow Problems, Heat Transfer Problem, Mass Exchange Problems, Reactor Problems, General Forms of Models.

UNIT 3. METHODS OF ANALYSIS:
Vectors, Matrices, and Linear Algebra, Unity of Linear Approximations, Linearization-Ordinary Differential Equations, Local Linearization-Partial Differential Equations, Perturbation Methods, Laplace Transform method, Calculus of Variations.

UNIT 4. INPUT-OUTPUT REPRESENTATION:
Block Diagram Notation, Transfer Functions, Transfer Matrices, Time Response, Some Simple Disturbances, Frequency Response, Linear Stability, Stability Criteria from Frequency Response.

UNIT 5. APPROXIMATE LINEAR MODEL:
Reduction in Order, Input-Output Approximations, Modal approximations, Singular Perturbations, Weakly coupled Systems.

UNIT 6. NON-LINEAR RESPONSE:
State Plane Responses, Methods of Poincare and Krylov and Bopgoliubov, Perturbation Methods, Quasi-linearization, Unsteady State Operation, Optimal Periodic Processes.

UNIT 7. THE DIRECT METHOD OF LYAPUNOV:
The Lyapunov Function,. Geometric Interpretation, Linear Systems, Slightly Nonlinear Systems, Krasovskii Forms, Other Lyapunov Functions.

UNIT 8. FLOW AND DIFFUSION RESPONSE:
Classification of partial Differential Equations, Hyperbolic Equations, Frequency Response, Method of Characteristics, Inversion Techniques, Wave Responses, Parabolic Systems, Time and Frequency Responses, Axial Dispersion, Comparison of Flow and Diffusion Responses, Stability Considerations.

TEXT BOOK:
1. Dynamic Behavior of processes : John C. Friendly.

NOTE: 8 questions are to be set – one from each unit. Students have to attempt any five Questions.

IC-466-E COMPUTER AIDED DESIGN OF CONTROL SYSTEMS

L	T	P
4	-	-

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam.: 3 hours

UNIT 1. INTRODUCTION TO INTERACTIVE COMPUTING AND USE OF GRAPHICS:
Requirements of interactive computing. Dedicated vs. time-sharing modes, interactive interface. CRT as a display device, Graphical quality, capacity, speed of modification, ease of programming. Line drawing. Solid area graphics and three dimensional display. Frame refreshing. Intelligent graphics terminals (Tecktronic 4051, IBM 5100). Graphics packages (GINOF, GIMOM and others). Use of interactive input tools such as light pen, cursor, Geometry of plotting in two dimensions, scaling.

UNIT 2. PROGRAM DESIGN AND STRUCTURE FOR INTERACTIVE COMPUTING:
Comparison of languages in terms of structured programming. Interactive use of languages in terms of structured programming. Interactive use. Portability. Use of small computers. Program evaluation. CAD facilities at UMIST based on DEC-10. Computer configuration of CAD of control systems.

UNIT 3. CAD OF SISO SYSTEMS:
System specification, Nyquist, inverse Nyquist, Bode and root locus plots. Development of software for graphic display of these plots. Design of compensators, software development for simulation.

UNIT 4. CAD OF MIMO SYSTEMS:
Stability, integrity, interaction, diagonal dominance. Graphical criteria for D.D. INA and minimum sensitivity INA. Software development for model transformation. Software development for INA method and optimal control. Simulation of MIMO systems.

NOTE: 8 questions are to be set –at least one from each unit. Students have to attempt any five Questions.

IC- 456-E **DIGITAL CONTROL SYSTEM**

L	T	P
4	-	-

Theory : 100 marks
Class work : 50 marks
Total : 150 marks
Duration of exam.: 3 hours

UNIT 1 INTRODUCTION:

What are sampled data and Digital Control System? Importance of Sampling in Control System. A Survey of the Methods of Analysis and Synthesis of Sampled-Data system.

UNIT 2. THE SAMPLING PROCESS:
Introduction, Mathematical Analysis of the Sampling Process, Mathematical Description of the Ideal Sampling Process-The Ideal Sampler, Summary.

UNIT 3. RECONSTRUCTION OF SAMPLED SIGNALS:
Introduction, Data Reconstruction by Polynomial Extrapolation, The Zero Order Hold, The First Order Hold, The Fractional Order Hold, The Exponential Hold

UNIT 4. THE Z-TRANSFORM THEORY:
Definition of the Transform, Evaluation of Z-Transform, Mapping of the S-Plane into the Z-Plane, The Inverse Z-Transformation, Theorems of the Z-Transform, The Pulse Transfer Function, Limitations of the Z-Transform Method, Response of Open Loop Sampled, Data Systems between sampling instants, Theorem of the Modified Z-Transforms.

UNIT 5. BLOCK DIAGRAM, SIGNAL FLOW GRAPH AND MATRIX REPRESENTATION OF SAMPLED DATA SYSTEMS:
Block Diagram Analysis and Transfer Functions of Closed Loop Sampled Data Systems, Signal Flow Graphs of Sampled Data Systems, Modified Z-Transform of Outputs of Closed Loop Sampled Data Systems, Transmission Matrix of Sampled Data Systems, The State-Variable Approach.

UNIT 6. TIME RESPONSE ANALYSIS:
System characteristic equation, Time response, Maping S-plane into Z-plane, Steady state accuracy, Stability Techniques, Bi-linear transformation, Routh Hurwitz Criterion, Jury stability test, Root locus, Nyquist criterion, Bode diagram, Interpretation of frequency response, Closed loop frequency response.

UNIT 7. DIGITAL CONTROLLER DESIGN:
Introduction to controller design, Control system specification, Compensation , phase lag compensator, phase lead compensator, phase lead design procedure, lag lead compensator, PID controllers, Analysis and design of Digital Control Systems using root locus and transform techniques.

TEXT BOOKS:

1. Digital Control & State Variable Methods. : M.Gopal ;. TMH
2. Digital Control System Analysis and Design : Charles L.Philips & H.Troy Nagle ;Prentice Hall International.

REFERENCE BOOK :

1. Discrete Time Control System: K. Ogata. ; Prentice Hall International

NOTE: 8 questions are to be set –at least one from each unit. Students have to attempt any five Questions.

MATH-453-E **STATISTICAL MODELLING**
(ELECTIVE FOR EE,EL,ME,CSE,IT,CHE)

L	T	P
4	-	-

Class Work	:	50 Marks
Exam.	:	100 Marks
Total	:	150 Marks
Duration of exam.	:	3 Hours

Unit-I :

Discrete random-variables and distributions. Continuous random variables and distributions. Mean and variance of a distribution. Expectation, Moments, Moment generating functions.

Unit-II :

Binomial, Poisson and Hypergeometric distributions, Normal distribution, Binomial distribution approximation by normal distribution.

Unit-III :

Discrete and continuous two-dimensional distributions. Marginal distribution, Independence of random variables, co-variance.

Unit-IV :

Random sampling, Estimation of parameters, maximum liklihood method, confidence intervals, Central limit theorem (Applications only).

Unit-V :

Testing of Hypothesis, two types of errors, Test for □ of the normal distribution with known $\square^2$, Tests for □ when $\square^2$ is unknown, Tests for the proportion p, test for $\square^{\square}$.

Unit-VI :

Chi-square test of goodness of fit. Student's t-variable and Snedecor's F-variable (Applications only). Non-parametric tests (sign test for the median and test for arbitrary trend only).

Unit-VII :

Method of least squares, regression analysis, confidence interval in regression analysis, correlation analysis. Test for the correlation coefficient.

Unit-VIII :

One-way and two-way analysis of variance (Applications only).

Books Recommended :

1. Advanced Engineering Mathematics, E. Kreyszig.
2. Mathematical Statistics, J.N. Kapur & H.C. Saxena.
3. Probability and Statistics for Engineers by Johnson PHI.

Note : Examiner will set eight questions, taking one from each unit. Students will be required to attempt any five questions.

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