B. TECH
CURRICULUM
AND
SYLLABUS

Semester I

Code	Subject	L	T	P	C
HSS101	English for Technical Communication I	2	0	0	2
MAT101	Mathematics I	3	0	0	3
PHY101	Physics I	3	0	0	3
CHY105	Chemistry	3	0	0	3
MEC101	Engineering Drawing	1	0	3	2
CIV101	Basic Civil and Mechanical Engineering	4	0	0	4
MEC181	Work Shop	0	0	3	1
CHY181	Chemistry Laboratory	0	0	3	1
	Total	16	0	9	19

Semester II

Code	Subject	L	T	P	C
HSS102	English for Technical Communication II	2	0	0	2
MAT102	Mathematics II	3	0	0	3
PHY102	Physics II	3	0	0	3
EEE101	Basic Electrical and Electronics Engineering	4	0	0	4
CHY101	Environmental Sciences	2	0	0	2
CSE102	Programming Languages	2	0	0	2
MEC103	Engineering Mechanics	3	0	0	3
PHY181	Physics Laboratory	0	0	3	1

CSE181	Programming Languages Laboratory	0	0	3	1
	Total	19	0	6	21

Semester III

Code	Subject	L	T	P	C
MAT201	Mathematics III	3	0	0	3
ECE257	Electronic Devices and Circuits	3	0	0	3
MEC257	Thermodynamics and Fluid mechanics	3	1	0	4
EIE201	Measurement system and Transducers	3	0	0	3
EEE203	Electric Circuit Analysis	3	1	0	4
EEE257	Control Systems	3	1	0	4
ECE297	Electronic Devices and Circuits Laboratory	0	0	3	2
EIE281	Measurements and Transducer Laboratory	0	0	3	2
MEC297	Thermodynamics and Fluid Mechanics Laboratory	0	0	3	2
	Total	18	2	9	27

Semester IV

Code	Subject	L	T	P	C
MAT211	Numerical Methods	3	0	0	3
HSSXXX	Humanities Elective I	3	0	0	3
EIE202	Electrical and Electronic Instrumentation	3	1	0	4

EIE206	Digital Electronics	3	1	0	4
EEE267	Electrical Machines	3	1	0	4
CSE206	Object Oriented Programming	3	0	0	3
EIE282	Electrical and Electronic Measurements Laboratory	0	0	3	2
EIE283	Digital Electronics Laboratory	0	0	3	2
	Total	18	4	6	25

Semester V

Code	Subject	L	T	P	C
EIEXXX	Major Elective I	3	1	0	4
	Minor Elective I	3	0	0	3
EIE301	Industrial Instrumentation	3	0	0	3
EIE302	Network Analysis and Synthesis	3	0	0	3
EIE303	Linear Integrated Circuits and Its Applications	3	1	0	4
ECE357	Microprocessor and Microcontroller	3	0	0	3
EIE381	Linear Integrated Circuits Laboratory	0	0	3	2
EIE382	Industrial Instrumentation Laboratory	0	0	3	2
	Total	18	2	6	24

Semester VI

Code	Subject	L	T	P	C
EIEXXX	Major Elective II	3	0	0	3
HSSXXX	Humanities - Elective II	3	0	0	3
EIE304	Digital Signal Processing	3	1	0	4
	Free Elective I	3	0	0	3
EIE305	Power Electronics	3	1	0	4
EIE306	Process Dynamics and Control	3	1	0	4
EIE383	Process Control Laboratory	0	0	3	2
ECE397	Microprocessor and Micro Controller Laboratory	0	0	3	2
	Total	18	3	6	25

Semester VII

Code	Subject	L	T	P	C
EIE401	Analytical Instrumentation	3	0	0	3
EEE457	Neural Network and Fuzzy Logic Control	3	0	0	3
EIEXXX	Major Elective III	3	0	0	3
EIEXXX	Major Elective IV	3	0	0	3
HSSXXX	Humanities Elective III	3	0	0	3
	Free Elective II	3	0	0	3
	Minor Elective II	3	0	0	3
EIE481	Virtual Instrumentation Laboratory	0	0	3	2
	Total	21	0	3	23

Semester VIII

Code	Subject	L	T	P	C
EIEXXX	Self study Elective	3	0	0	3
EIE 499	Project Work	0	0	24	10
	Total	3	0	24	13

Total Credit (from 1st semester to 8th semester = 177)

MAJOR ELECTIVES

Code	Subject	L	T	P	C
EIE307	Programmable Logic Controllers	3	0	1	4
EIE308	Computer Control of Process	3	0	1	4
EIE309	Process Components Design	3	0	0	3
EIE310	Industrial Drives and Control	3	0	1	4
EIE311	Process Modeling and Simulation	3	0	1	4
EIE312	Communication Engineering	3	0	0	3
EIE313	Power Plant Instrumentation and Control	3	0	0	3
EIE314	VLSI Design	3	0	0	3
EIE315	Virtual Instrumentation	3	0	0	3
EIE316	Telemetry and Telecontrol	3	0	0	3
EIE317	Digital Instrumentation	3	0	0	3
EIE318	Industrial Chemical Process	3	0	0	3
EIE319	Piping and Instrumentation Diagrams	3	0	0	3
EIE320	Real Time Systems	3	0	0	3
EIE321	Pc Based Instrumentation	3	0	0	3
EIE403	Instrumentation and Control In Petro-Chemical Industries	3	0	0	3
EIE404	Instrumentation and Control In Paper Industries	3	0	0	3
EIE405	UltraSonic and Optical Instrumentation	3	0	0	3
EIE406	Embedded Instrumentation System	3	0	0	3

EIE407	Robotics and Automation	3	0	0	3
EIE408	Analog and Digital Communication System	3	0	0	3
EIE409	Bio-Medical Instrumentation	3	0	0	3
EIE410	Digital Control System	3	0	0	3
EIE411	Artificial Intelligence and Expert System	3	0	0	3
EIE412	Optimal And Adaptive Control	3	0	0	3
EIE413	Instrumentation Analysis for Environmental Sciences	3	0	0	3
EIE414	Instrumentation System Design and Analysis	3	0	0	3
EIE415	Micro Controller Based System Design	3	0	0	3
EIE416	Optimization Techniques	3	0	0	3

MINOR ELECTIVES

Code	Subject	L	T	P	C
CSE357	Software Engineering and System	3	0	0	3
CSE457	Networks and Protocols For Instrumentation	3	0	0	3
CSE467	Data Base Management	3	0	0	3
MEC308	Mechatronics	3	0	0	3
MEC457	Mems and Nano Technology	3	0	0	3
INT355	Internet and Web Technology	3	0	0	3

HUMANITIES ELECTIVES

Code	Subject	L	T	P	C
HSS001	Total Quality Management	3	0	0	3
HSS002	Engineering Management	3	0	0	3
HSS004	Industrial Psychology	3	0	0	3
HSS006	Professional Ethics	3	0	0	3
HSS014	Marketing Management	3	0	0	3
HSS015	Management Concepts and Techniques	3	0	0	3
HSS016	Organizational Psychology	3	0	0	3
HSS017	International Economics	3	0	0	3

HSS018	Communication Skills	3	0	0	3
HSS020	Human Resource Management	3	0	0	3
HSS023	Entrepreneurship Development	3	0	0	3

SEMESTER I

HSS101	**ENGLISH FOR TECHNICAL COMMUNICATION I** (Common to all branches)	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

FOCUS ON LANGUAGE

Parts of speech – nominal compounds, noun phrases – relative pronoun – adjective – numerical, comparison and contrast, collocation and word combinations – verb – preposition and relative – conjunction– connectives, expressions of purpose and function, cause and effect – articles – adjectives – sentence pattern – tenses – voice – rewriting the sentences in impersonal/abbreviated passive grammatical structures – concord – sentence level verb noun agreement – gerund – rewriting infinitive into gerund – imperative – rewriting imperative into recommendation using should – word formation – varied grammatical function of the same word – affixes – prefix and suffix, number prefix, negative prefix – reported speech – editing strategies – conditional structures – real, unreal, no possibility, zero condition – writing formal definition – abbreviation and acronym – idioms and phrases – varieties of english – british versus american

LISTENING SKILLS

Comprehension practice – vocabulary development – familiarity to varied types of spoken english and accents – developing ability to understand audio and video media – aiming at overcoming barriers to listening – listening to documentaries, radio news broadcasts, TV news telecasts – active listening in discussions and to lectures – taking notes while listening – extracting information from listening

SPEAKING SKILLS

Oral practice – role play – interplay – seminar – transcoding visual into oral – participating in short and longer conversation – voice record, replay, correction of intonation, pronunciation and flow of speech – phonemes – vowels, consonants, stress, rhythm, intonation – group discussion – participative learning – acquiring proficiency, fluency, accuracy in oral communication – speaking practice – developing confidence – extempore speech – learning professional/conversational etiquette

READING SKILLS

Vocabulary extension – improving vocabulary – intensive reading – reading strategies – identifying topic sentence – guessing meaning from content – picking out specific information – professional reading – reading practice – predicting the content, critical and analytical reading – reading articles in english newspapers, sports magazines, encyclopedias – reading aloud, use of stress and intonation – reading and comprehending technical materials – cloze reading

WRITING SKILLS

Discourse cohesion – improving writing skills, avoiding common grammatical errors in academic writing – extending the hints – writing shorter sentences – punctuation – dialogue writing – paragraph writing, problems and solutions, achieving coherence, transition words, sequence words – essays of descriptive and argumentative – writing instructions, use of imperatives – jumbled sentences into sequential paragraph using linguistic clues – report writing – technical reports, industry visit reports, events reports – writing recommendations – letter writing – formal and informal letters – job application and resume, permission for in–plant training, business correspondence letters, calling for quotation, placing order, lodging complaint, persuasive letters – assignment writing – mini–project – transcoding – transferring of information from text to pictorial/graphical representation and vice versa

TEXT BOOK

1. Rizvi, M., Ashraf., Effective Technical Communication, Tata McGraw–Hill, 2005

REFERENCES

1. Daniel Jones, English Pronouncing Dictionary, Universal Book Stall, New Delhi, 17th Edition, 2000
2. Geoffrey Leech, Fan Svartvik, A Communicative Grammar of English, Pearson Education Asia, 1994
3. Hornby, AS., Oxford Advanced Learner's Dictionary of Current English, OUP, 7th Edition, 2005
4. Manivannan, G., English for Engineers – A Book on Scientific and Technical Writing, Govi Publications, 2005
5. Martin Cutts, Plain English Guide – How to Write Clearly and Communicate Better, Oxford University Press, 1999

MAT101	MATHEMATICS I (Common to all Branches)	L	T	P	C
		3	0	0	3

MATRICES

Review of linear algebra–matrix operations – addition, scalar multiplication, multiplication, transpose, adjoint and their properties– special types of matrices – null, identity, diagonal, triangular, symmetric, skew–symmetric, Hermitian, skew–Hermitian, orthogonal, unitary, normal– rank– consistency of a system of linear equations– solution of the matrix equation ax = b – row–reduced echelon form

EIGEN VALUE PROBLEMS

Eigen value and eigen vector of real matrix – properties of eigen values and eigen vectors – Cayley– Hamilton theorem – orthogonal transformation of a real symmetric matrix to diagonal form – reduction of quadratic form to canonical form by orthogonal transformation – index, signature and nature of quadratic form

DIFFERENTIAL CALCULUS

Review of limits – continuity and differentiability – curvature – cartesian and parametric co–ordinates – centre and radius of curvature – circle of curvature–evolutes – involutes – envelopes – partial differentiation –Euler's theorem for homogeneous functions– total differential – Taylor's expansion (two variables) – maxima / minima for functions of two variables – method of Lagrangian multiplier – Jacobians

THREE DIMENSIONAL ANALYTICAL GEOMETRY

Direction cosines and ratios – angle between two lines – equations of a plane – equations of straight line – coplanar lines – shortest distance between two skew lines – sphere – tangent plane – plane section of a sphere – orthogonal spheres

ORDINARY DIFFERENTIAL EQUATIONS

Solutions of second and higher order linear ODE with constant coefficients – Cauchy's and Legendre's linear equations – simultaneous first order linear equations with constant coefficients – method of variation of parameters

TEXT BOOKS

1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore , 8th Edition., 2001
2. Arumugam, S., ea.tl., Engineering Mathematics, Volume-I, Scitech Publications (India) Pvt. Ltd., Chennai, 2nd Edition., Reprint 2000, 1999

REFERENCES

1. Grewal , B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 37th Edition., 5th Reprint 2004
2. Venkataraman, M. K., Engineering Mathematics First Year, The National Publishing Company, Chennai, 2nd Edition., Reprint 2001

PHY 101	PHYSICS I (common to all branches)	L	T	P	C
		3	0	0	3

ACOUSTICS AND STRUCTURE OF SOLIDS

Classification of sound – reverberation, Sabine's formula, common acoustical defects and remedies- classification of solids– crystal structures, x–ray diffraction, crystal growth, crystal defects

LASER AND FIBRE OPTICS

Interaction of radiation with matter –quantum mechanical view, three and four level laser system, engineering and medical applications –introduction of fibre optics– classification of fibre– engineering and medical applications

QUANTUM PHYSICS

Inadequacy of classical mechanics –black body radiation, Plancks law, photoelectric effect, compton effect ,Einstein's photoelectric equation, Schrodinger wave equation, Particle in one, three dimensional box

NDT, NEW ENGINEERING MATERIALS

ultrasonics, ultrasonics flaw detectors, x–ray photography, fluoroscopy, thermography, gamma ray spectroscopy , characterization technique nano phase materials, biomaterials, non linear materials, polymer materials

DIGITAL ELECTRONICS

Introduction, analog to digital circuits, conversion of numbers one's complement,2's complement, logic gates, Boolean algebra, Demorgan's theorem, Karnaugh's maps

TEXT BOOK

1. Gaur R. K., Gupta, S.L., Engineering Physics, Dhanpat Rai Publishers, New Delhi, 2001

REFERENCES

1. Murthy V.S.R., et.al., Structures and Properties of Engineering Materials, Tata McGraw Hill Publishing company Limited, New Delhi, 2003
2. Ali Omar, M., Elementary Solid State Physics, Pearson Education (Singapore), Indian Branch, New Delhi, 1st Edition, 2006
3. William F. Smith., Foundations of materials science and Engineering, McGraw–Hill, New York, 3rd Edition , 2003
4. Mathews. P.M., Venkatesan. K., Text Book of Quantum Mechanics, Tata McGraw Hill company, Delhi, 2003
5. Gupta S.L., Kumar.V., Hand book of Electronics, Pragati Prakashan, Meerut, 28th Edition, 2001

CHY 105	CHEMISTRY (Common to ECE, EEE & EIE)	L	T	P	C
		3	0	0	3

WATER

Water quality parameter (industry and drinking water) – hardness, definition, classifications, expressions, units of hardness of water with respect to $CaCO_3$, problems –estimation of hardness by edta method (theory only) – definition of alkalinity (theory only) – boiler feed water – requirements, disadvantages of using hard water in boilers, removal of boiler scales and sludges – water softening – zeolite process, demineralization (ion – exchange process), desalination

CORROSION SCIENCE AND CONTROL ENGINEERING

Corrosion definitions – electrode potential – principles of dry and wet corrosion, factors influencing rate of corrosion, types of corrosion – corrosion control – impressed current cathodic protection and sacrificial anodic protection method – corrosion inhibitors – protective coatings, surface conversion coatings, organic coatings (paints)

POLYMERS

Polymers classification, difference between thermoplastic and thermosetting plastics – properties of plastic – degree of polymerization – types of polymerization (mechanism) – phenol formaldehyde resin, epoxy resin, polyurethanes, teflon – amino resins (urea formaldehyde, nylon.11, nylon.66 & nylon 6), PET, PVC – composites – definition, characteristics, constituent. types– fibre reinforced plastics (frp), metal matrix composites (mmc), ceramic matrix composites (cmmc),properties and applications

INSTRUMENTAL METHODS OF ANALYSIS

Electro magnetic radiation – absorption of radiation, Beer–lambert's law – UV-Visible spectroscopy – IR spectroscopy – principle and instrumentation (block diagram only) estimation of iron by colorimetry – flame photometry, principle and instrumentation (black diagram only), estimation of Na by flame photometry – atomic absorption spectroscopy, principle and instrumentation (block diagram only)-quantitative estimation of nickel by atomic absorption spectroscopy

ENERGY STORAGE DEVICES AND NANOTECHNOLOGY

Batteries – introduction, primary and secondary batteries – dry cell – alkaline batteries, lead acid storage cell, Nicad battery, lithium batteries – fuel cell (hydrogen – oxygen fuel cell) – photo galvanic cell – chemical structure and electronic behavior of conduction polymer, semi conducting properties of organic polymers containing metal group such as polyferrocenes – optical fibre principle and structure, characteristic of optical fibre, photoresist optical fibre, advantages of optical fibres – nanotechnology – introduction, preparation, characterization and application

TEXT BOOKS

1. Jain, P.C ., Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing company (P) Ltd., New Delhi, 14th Edition, 2002
2. Sharma, B.K., Industrial Chemistry, Goel Publishing House, Meerut, 12th edition 2001

REFERENCES

1. Puri, B.R., Sharma, L.R., Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co., Jalandhar, 40th Edition, 2003
2. Vogel A.I., A text book of Quantitative Inorganic Analysis, ELBS, London, 3rd Edition, 2000
3. Mick Wilson., Kamali Kannangara., Nanotechnology: Basic science and emerging technology, Overseas India Pvt. Ltd. Press, New Delhi, 1st Edition, 2005
4. Bandyopadhyay, A.K., Nano Materials, New Age International Publishers, New Delhi, 1st Edition 2007

MEC101	ENGINEERING DRAWING (Common to all branches)	L	T	P	C
		1	0	3	2

INTRODUCTION

Importance of graphics – use of drafting instruments – BIS conventions and specifications – size, layout and folding of drawing sheets – lettering dimensioning and scales - Orthographic principles - free hand sketching in first angle projection from pictorial views

PROJECTION OF POINTS, STRAIGHT LINES AND PLANES

Projection of points, located in all quadrants - projection of straight lines located in the first quadrant, determination of true lengths and true inclinations, location of traces - projection of polygonal surface and circular lamina located in first quadrant inclined to one or both reference planes

PROJECTION AND SECTION OF SOLIDS

Projection of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method. Section of above solids in simple vertical position by cutting planes inclined to any one of the reference planes, obtaining true shape of section

DEVELOPMENT OF SURFACES

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones - development of lateral surfaces of combined solids – prism and cylinder, cylinder and cylinder with axes at right angles with no offset

ISOMETRIC AND PERSPECTIVE PROJECTION

Principles of isometric projection – isometric view and projections of simple solids, truncated prisms, pyramids, cylinders and cones

Perspective projection of prisms, pyramids and cylinders by visual ray and vanishing point methods

TEXT BOOK

1. Bhatt, N.D., Engineering Drawing, Charotar publishing House, New Delhi, 46th Edition, 2003

REFERENCES

1. Nataraajan, K.V., A text book of Engineering Graphics, Dhanalakshmi Publishers, Chennai, 2006
2. Shah, M.B., and Rana, B.C., Engineering Drawing, Pearson Education, New Delhi, 2005
3. Gopalakrishnana, K.R., Engineering Drawing (Vol. I and II), Subhas Publications, 1998
4. Luzadder and Duff, Fundamentals of Engineering Drawing, Prentice Hall of India Pvt Ltd, New Delhi, XI Edition, 2001
5. Venugopal, K., Engineering Graphics, New Age International (P) Limited, 2002

CIV101	**BASIC CIVIL AND MECHANICAL ENGINEERING** (Common to all branches)	**L**	**T**	**P**	**C**
		4	**0**	**0**	**4**

CIVIL ENGINEERING

BUILDINGS

Characteristics of good building materials such as stones, bricks, plywood and ceramic tiles, timber, cement, aggregates and concrete - Basic functions of buildings – Major components of buildings – Foundations - Purpose of a foundation – Bearing capacity of soils –

types of foundations. Proper methods of construction of Brick masonry – Stone masonry – Hollow Block masonry. Beams – Lintels – Columns – Flooring – Damp proof course – surface finishes – Doors and windows – Roofing

TRANSPORTATION ENGINEERING

Principles and Classification of surveying, Chain surveying, Compass surveying and leveling - Importance of roads – Classification of Highways –water bound macadam, bituminous and cement concrete roads –. Railways - Importance of railways – Gauges – Components of a permanent way. Bridges - Components of Culverts – Causeways, Slab Bridge, T-beam and slab bridge, Suspension bridge

MECHANICAL ENGINEERING

BOILERS AND TURBINES

Boilers - boiler mountings and accessories – Cochran boiler, Locomotive boiler, Babcock and Wilcox boiler, fire and water tube boilers - Steam turbine - single stage impulse turbine, Parson's reaction turbine, difference between impulse and reaction turbines

POWER PLANTS AND INTERNAL COMBUSTION (IC) ENGINE

Classification of power plants – steam, nuclear, diesel and hydro power plants - Alternate sources of energy - solar, wind, tidal, geothermal, ocean thermal energy conversion. – IC engine - components, working of four and two stroke petrol and diesel engines

PRODUCTION TECHNOLOGY

Metal casting and forming process –patterns, moulding, melting of cast iron, casting – forging – rolling – extrusion – drawing - Metal joining process - welding – arc welding, gas welding, brazing and soldering - Metal machining – lathe, drilling machine, milling machine, shaping machine, planing machine, introduction to Computer Numerical Control machining

TEXT BOOK

1. Shanmugam, G,, and Palanichamy, M.S., Basic Civil and Mechanical Engineering, Tata McGraw Hill Publishing Co., New Delhi, 1996

REFERENCES

1. Khanna, K., Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2000
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, New Delhi, 1997
3. Venugopal K., Basic Mechanical Engineering, Anuradha Publications, Kumbakonam, 2000
4. Shanmugam G., Basic Mechanical Engineering, Tata McGraw Hill Publishing Co.,New Delhi, 2001

MEC181	WORK SHOP (Common to all branches)	L	T	P	C
		0	0	3	1

CARPENTRY

Carpentry tools - practice in marking, sawing, planing and chiseling – making simple joints: lap joint, T-joint, dovetail joint, mortise and tenon joint

FITTING

Fitting tools - practice in marking, filing, punching, hacksawing - fitting to size and drilling - making of simple mating profiles: V, square, dovetail, half round joints

SHEET METAL

Study of press, die and tools - sheet metal layout - development of lateral surfaces -simple exercises: blanking, forming, bending and flanging

DRILLING

Drilling and tapping in drilling machines

Demonstration on:

i) Welding operations like butt joint and lap joints in Arc welding

ii) Foundry operations like mould preparation for split pattern

iii) Smithy operations like the production of hexagonal bolt

iv) Preparation of plumbing line sketches – basic pipe connections involving the fittings like valves, taps, couplings, unions, reducers, elbows and other components used in household fittings

CHY 181	CHEMISTRY LABORATORY (common to all branches)	L	T	P	C
		0	0	3	1

1. Preparation of standard and buffer solutions
2. Estimation of hardness of water sample by EDTA method
3. Determination of dissolved oxygen in a sample of water
4. Estimation of chloride and fluoride ion in water sample
5. Determination of alkalinity of water sample
6. Estimation of hydrochloric acid by pH titration
7. Estimation of ferrous ion by potentiometric titration
8. Estimation of mixture of acid by conductometric titration
9. Estimation of iron by spectrophotometric method
10. Flame photometry – Determination of Na & K

SEMESTER II

		L	T	P	C
HSS102	**ENGLISH FOR TECHNICAL COMMUNICATION II** (Common to all branches)	**2**	**0**	**0**	**2**

GRAMMAR AND VOCABULARY

Grammar and Vocabulary – introduction to grammatical models – proper use of tenses, concord, voice, articles, punctuation, and modal auxiliaries

RECEPTION SKILLS

Listening and language development – improving listening skills – comprehension practice – comprehend classroom lectures, simple technically oriented passages – listening to news bulletins, pre–recorded talks, different speech styles, comprehending the essential meaning – physical and psychological barriers to listening –steps to overcome the barriers – practice in note–taking while listening

SPEAKING TECHNIQUES

Speaking practice – improving conversing skills – improving self–expression – developing confidence and fluency in oral communication – physical and psychological barriers to speaking – steps to overcome the barriers – Formal and public speaking practice – extemporary talk practice – speech process – fluency and accuracy in speech – developing persuasive speaking skills – conversation in a given milieu, social and cultural surroundings – practice in giving small talks on local topics for a minute or two – goal oriented group discussion – participating in seminars – independent and effective communication

READING STRATEGIES

Reading comprehension – vocabulary extension methods – speed reading practice – technical and non–technical materials – practice in various reading techniques – skimming, scanning, eye reading –

looking for specific information – comprehending the given passages, technical information

WRITTEN COMMUNICATION

Basic grammatical structures – Alphabet of other languages – Paragraph writing – Expressing the idea in writing – Avoiding and correcting common errors – Effective writing techniques – brevity, clarity, objectivity and simplicity – Discourse writing – definition, description, instruction – Note–making – Proof reading – Mechanics of writing – Writing formal, informal letters, Technical reports – Reference skills – using dictionary better

TEXT BOOKS

1. Rizvi M. Ashraf., Effective Technical Communication, Tata McGraw–Hill, 2005
2. Rutherfoord Andrea, J., Basic Communication Skills for Technology, Pearson Education, 2002

REFERENCES

1. Deborah C. Andrews, Margaret D. Bickle, Technical Writing – Principles and Forms, Macmillan, 1978
2. Manivannan,G., English for Engineers – A Book on Scientific and Technical Writing, Govi Publications, 2005
3. Sarah Freeman., Written Communication in English, Orient Longman, 2000
4. Thomson, A J., Martinet, AV., A Practical English Grammar, OUP, 4th Edition, 1986
5. Tom Hutchinson, Alan Waters, English for Specific Purpose, Cambridge University Press, 1987

MAT102	MATHEMATICS II (Common to all Branches)	L	T	P	C
		3	0	0	3

SEQUENCES AND SERIES

Convergence and divergence of infinite series – series of positive terms – comparison, D'Alembert's ratio, Raabe's and Cauchy's root tests – convergence of alternating series – Leibnitz's test (proof of theorems and tests not included) – elementary notions of absolute and conditional convergence – power series – Taylor's theorem(one variable)

ANALYTIC FUNCTION AND CONFORMAL MAPPING

Function of a complex variable – analytic function – necessary conditions – cauchy – riemann equations – sufficient conditions (excluding proof) – properties of analytic function – harmonic conjugate – construction of analytic functions – conformal mapping – w = z+a, az, 1/z, e^z, sin z, cos z and bilinear transformation – fixed points – cross ratio

COMPLEX INTEGRATION

Statement and application of Cauchy's integral theorem and integral formula – Taylor and Laurent expansions – isolated singularities – residues – Cauchy's residue theorem – contour integration over unit circle and semicircular contours (excluding poles on boundaries)– evaluation of real integrals using contour integration

MULTIPLE INTEGRALS

Review of Riemann integrals – double integration – cartesian and polar coordinates – change of order of integration – change of variable between cartesian and polar – area as double integral – triple integration in cartesian, cylindrical and spherical polar coordinates – volume as triple integral

VECTOR CALCULUS

Gradient, divergence and curl – directional derivative – irrotational and solenoidal vector fields – vector integration – green's theorem in

a plane, gauss divergence theorem and stoke's theorem (excluding proof) – simple applications

TEXT BOOKS

1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore , 8th Edition, 2001
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A.,Engineering Mathematics Volume II, Scitech Publications (India) Pvt. Ltd., Chennai, 1st Edition., Reprint 2000, 1999

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1. Grewal , B.S., Grewal, J.S., Higher Engineering Mathematic, Khanna Publishers, New Delhi, 37th Edition, 5th Reprint 2004
2. Venkataraman, M. K., Engineering Mathematics First Year, The National Publishing Company, Chennai, 2nd Edition, Reprint 2001
3. Venkataraman, M. K., Engineering Mathematics –III A, The National Publishing Company, Chennai, 11th Edition, Reprint 2002

PHY 102	PHYSICS II (Common to ECE, EEE and EIE)	L	T	P	C
		3	0	0	3

CONDUCTING MATERIALS

Electron theory of solids – classical free electron theory, quantum free electron theory, Band theory of solids

SEMI CONDUCTING AND SUPER CONDUCTING MATERIALS

Semi conducting materials - Introduction, Types of semi conducting materials, carrier concentration - Hall effect – determination of Hall coefficient - Superconducting Phenomena Properties of superconductors -Type I and Type II superconductors, High Tc Superconductors, Application of super conductors

MAGNETIC MATERIAL

Classical theory of magnetism quantum theory of paramagnetism,

Ferromagnetism, Ferrites, Applications of magnetic materials

DIELECTRIC MATERIALS AND OPTICAL MATERIALS

Electronic, Ionic, orientational and space charge polarization , Internal field and deduction of Clausius – Mosotti relation ,properties of Dielectric materials, classification of insulating materials optical properties of semiconductor- imperfection of crystals, Luminescence , Fluorescence and phosphorescence , Light Emiting Diode, Liquid crystal displays

ENGINEERING MATERIALS

Metallic glasses as transformer core material, Nanophase materials, shape memory alloys, Biomaterials (metals & alloys, ceramics) -Non linear materials – Second harmonic generation, Optical mixing, Optical phase Conjugation, Solitons, IC packaging materials

TEXT BOOK

1. Arumugam.M., Materials Science, Anuradha Agencies, Kumbakonam, 3rd Edition,2003

REFERENCES

1. Aswani K.G., A Text book of Material Science, S.Chand & Co., Ltd., New Delhi, 2nd Edition, 2001
2. William F.Smith, Foundations of Materials Science and Engineering, McGraw-Hill, New York, 3rd Edition, 2003
3. Wahab M.A., Solid State Physics, Narosa Publishing House, New Delhi, 1999
4. Pillai S.O., Solid State Physics, New Age International Publication, New Delhi, 5th edition, 2003
5. Ali Omar.M., Elementary Solid State Physics, Pearson Education, Singapore, Indian Branch,New Delhi, 2002
6. Murthy V.S.R. et al, Structure and Properties of Engineering Materials, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2003

EEE101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to all branches)	L	T	P	C
		4	0	0	4

ELECTRICAL CIRCUITS

Introduction to electric circuits – laws of electric circuits– Ohm's Law, Kirchoff's Laws– analysis of DC circuits – mesh, nodal – introduction to AC circuits– average Value, RMS value, power and power factor–analysis of 3 phase AC circuits – balanced and unbalanced circuits

ELECTRICAL MACHINES

DC Machines –principle of operation–DC generators–emf equation, characteristics, types– DC motors–shunt, series, compound– single phase transformer – principle of operation, emf equation, phasor diagram –induction motors–single phase, three phase–alternators– principle of operation, emf equation, characteristics

ELECTRICAL MEASUREMENTS

Moving coil –ammeter, voltmeter – moving iron instruments – ammeter, voltmeter – dynamometer – wattmeter, energy meter

BASIC ELECTRONICS

Semiconductor devices – introduction, construction, types – pn junction diode –working principle, characteristics– zener diode– working principle, characteristics uni–junction transistor– operation, characteristics –field effect transistor– operation, characteristics– bipolar junction transistor– operation, characteristics–applications– half wave and full wave rectifiers

DIGITAL ELECTRONICS

Introduction to binary number system–logic gates –AND, OR, NOT, NAND, NOR, exclusive OR–boolean algebra– combinational circuits – half adder, full adder, half subtractor, full subtractor

INTEGRATED CIRCUITS

Operational amplifier–introduction, DC characteristics, AC characteristics–types of operational amplifier–inverting, non–inverting– applications– scalar, adder, Subtractor, differentiator, and integrator

TEXT BOOKS

1. Edward Hughes., Electrical &Electronics Technology, Pearson Education ltd, 9th edition, 2005
2. Kothari, D.P., and Nagrath.I.J., Basic Electrical Engineering,TataMcGraw Hill Second Edition

REFERENCES

1. Malvino, A.P., Electronic Principles, Tata McGraw Hill International, 1998
2. Vincent Deltora, Electrical Engineering fundamentals, Prentice hall of India, 2nd edition, 2003
3. Muraleedharan, K.A., Muthusubramanian, R., and Salivahanan, S., Basic Electrical and Electronics and Computer Engineering, Tata McGraw Hill, 1997

CHY 101	ENVIRONMENTAL SCIENCES (Common to all branches)	L	T	P	C
		2	0	0	2

NATURAL RESOURCES

Definitions –scope of environmental sciences – forest resource – food resource – land resource – water – mineral resources – utilization of natural resource, impact on environment – conservation of natural resources

ECOSYSTEM AND BIODIVERSITY

Concept – structure and function – energy flow in ecosystem – ecological succession – food chain – food web, ecological pyramids – biodiversity, definition, values, threats to biodiversity, conservation of biodiversity

ENVIRONMENTAL POLLUTION

Definition, causes, effects and control measures of air, water and soil pollution – thermal and nuclear pollution

MANAGEMENT OF ENVIRONMENTAL POLLUTION

Solid waste management – treatment methods adopted for municipal sewage and industrial effluent – hazardous and biomedical waste management

TOOLS FOR ENVIRONMENTAL MANAGEMENT

Environment impact assessment – precautionary and polluter pay principle – constitutional provision – (air, water and forest) – waste minimization techniques, cleaner technology options, bioremediation

TEXT BOOK

1. Dhameja, S.K., Environmental engineering and Management, S. K. Kataria and sons, New Delhi, 1st edition 2004

REFERENCES

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, 1st edition, 2001
2. Miller, T.G. Jr., Environmental Science, Wadsworth Publishing Co. USA, 2nd edition, 2004
3. Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media., New Delhi, 2nd edition, 2004
4. Masters, G. M., Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi, 2nd edition, 1997
5. Henry, J. G., Heike, G. W., Environmental Science and Engineering, Prentice Hall International Inc., New Jersey, 1st edition, 2005

CSE102	PROGRAMMING LANGUAGES (Common to all branches)	L	T	P	C
		2	0	0	2

BASIC ELEMENTS OF C AND CONTROL STATEMENTS

Introduction to C- Structure of C language – Lexical elements of C- Operators and Expressions-Operator precedence and associativity of operators -Input and Output Functions-Library Functions –Header Files-Simple Computational problems. Decision Making: if statement - if-else statement - else-if ladder - switch statement – Looping Control Structure - the break statement - ? : operator - Continue statement - goto statement – Problems using Control Structures

FUNCTIONS, PROGRAM STRUCTURES AND ARRAYS

Prototypes and Functions – Declaring, defining and accessing Functions- Parameter passing methods-Recursion - Storage Classes - Automatic Variables -External Variables – Static and Register Variables – Programs using functions. Defining and Processing an Array - Passing Arrays to Functions - Multidimensional Arrays - Arrays and Strings - Enumerated data types-Programs using sorting, searching and merging of arrays

POINTERS, STRUCTURES AND UNIONS

Pointer Fundaments - Pointer Declarations - Passing Pointers to Functions - Arrays and Pointers - Pointers and One-Dimensional Arrays - Pointers and Multidimensional Arrays - Operations on Pointers - Pointers and Structures - Dynamic Memory Allocation – Command Line Arguments – Programs using Pointers with Functions, Arrays and & Structures. Defining a Structure - Processing a Structure - User-Defined Data Types – Union – Nested structure - Structures and Pointers - Passing Structures to Functions - Self Referential Structures

DATA FILES AND DATA STRUCTURES

Opening and Closing a Data File - Creating a Data File - High Level File Operations - Processing and Updation of Data Files -

Unformatted Data Files - Low Level Programming – File Handling Programs. Linked List – Creation, Insertion and Deletion of elements - Stack and Queue implementation using Linked List

UNIX BASICS AND SHELL PROGRAMMING

Shell Fundamentals - Shell Commands - Shell Decisions and Repetitions - Command line usage - Wildcard expansion - Redirection of I/O, pipes and filters. Shell Programming - Simple scripts - Specifying the interpreter - Shell variables - The Environment - Control flow; test, if, for, while, case - Command substitution - Signal catching - Shell functions - Aliases - Reading from the Standard I/P - Startup Files - basename and dirname - Expression evaluation

TEXT BOOKS

1. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw Hill, Second Edition, 1996
2. Lowell Jay Arthur and Ted Burns, UNIX Shell Programming, John Wiley & Sons Canada, Ltd, Fourth Edition, 1997
3. Deshpande P.S, Kakde O.G, C & Data Structures , Dreamtech Press, First edition, 2004

REFERENCES

1. Brian Kerninghan W, Dennis Richie M, The C Programming language, Pearson Education,2005
2. Johnsonbaugh R.and Kalin M, Applications Programming in ANSI C, Pearson Education, Third Edition ,2003
3. Behrouz A.Forouzan and Richard Gilberg F, A Structured Programming Approach Using C, Brooks-Cole Thompson Learning Publications, Second Edition, 2001
4. Bruce Molay, Understanding UNIX/LINUX Programming: A Guide to Theory and Practice, Prentice Hall, First Edition, 2002.
5. Glass, G., Ables, K. UNIX for Programmers and Users, Prentice Hall, 1999
6. Stephen Kochan and Patrick Wood, UNIX Shell Programming, Pearson Education, Third Edition, 2003

MEC103	ENGINEERING MECHANICS (Except BT, CSE and IT)	L	T	P	C
		3	0	0	3

STATICS OF PARTICLES

Fundamental principles and concepts - vector algebra, Newton's laws, gravitation, force external and internal, transmissibility - velocity and acceleration - Couple- Moment about point and about axis - Varignon's theorem - resultant of concurrent and non-concurrent coplanar forces - static equilibrium, free body diagram, reactions - Problem formulation concept in 2-D and 3-D statics

TRUSSES AND FRAMES

Trusses - assumptions, rigid and non-rigid trusses- simple trusses in plane and space- analysis by method of joints and by method of sections- compound trusses-statically determinate, rigid, and completely constrained - analysis of frames and machines

FRICTION

Frictional forces- laws of friction- simple contact friction - rolling resistance - belt friction

PROPERTIES OF SURFACES AND SOLIDS

Centroids of lines - areas, volumes, composite bodies - center of mass - area moment of Inertia - mass moment of inertia - principal moment of inertia

DYNAMICS OF PARTICLES

Displacements, velocity and acceleration, their relationship – relative motion – Curvilinear motion – Newton's law – work Energy equation of particles – impulse and momentum – impact of elastic bodies

TEXT BOOK

1. Beer, F.P., and Johnson, E.R., Vector Mechanics for Engineers – Statics and Dynamics, Tata McGraw Hill, New York, 2004

REFERENCES

1. Merriam, J.L., Engineering Mechanics, Volume I – Statics, and Volume – II, Dynamics 2/e, Wiley International,1998.
2. Irving , H., Shames, Engineering Mechanics, Statics and Dynamics, Third Edition, Prentice Hall of India Pvt. Ltd., 1993

PHY 181	PHYSICS LABORATORY (Common to all Branches)	L	P	T	C
		0	0	3	1

1. To determine the acceleration due to gravity using Compound Pendulum
2. To determine the Rigidity Modulus of wire using Torsional Pendulum
3. To find thickness of the given two glass plates using single optic lever
4. To determine the thermal conductivity of a bad conductor – Lee's disc method
5. To determine the refractive index of the material of the prism
6. To find the prominent wave length of mercury spectrum using grating
7. To determine the particle size using Laser
8. To determine the coefficient of viscosity of the liquid by Poiseuille's method
9. To determine the young's modulus of given material using Uniform Bending
10. To Determine the thickness of a given material using Air wedge method
11. To determine the focal length of a biconvex lens using Newton's Rings method

12. To determine the velocity of ultrasonic waves in the liquid using ultrasonic Interferometer

CSE181	**PROGRAMMING LANGUAGES LABORATORY** (Common to all branches)	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

WORD PROCESSING, SPREADSHEET, POWERPOINT

1. To create an advertisement in Word
2. To illustrate the concept of mail merging in word
3. To create a spread sheet to analyze the marks of the students of a class and also to create appropriate charts
4. To create the presentation for the department using Power Point

C PROGRAMMING

5. To write a simple menu driven calculator program using switch statement
6. To write a program to print Pascal's triangle
7. To write a program for electricity bill preparation
8. To write a program to print the sine and cosine series
9. To print Fibonacci series up to N numbers

ARRAYS AND FUNCTIONS

10. To write a program to perform Matrix multiplication
11. To write a program to sort a given set of numbers
12. To write a program to perform string manipulation manipulations function like string concatenations, comparison, find the length and string copy without using library functions
13. To write a program to arrange names in alphabetical order.
14. To write a C program to check whether a number is palindrome or not using functions
15. To write a program to calculate the factorial of the given number using functions

POINTERS, STRUCTURES AND FILES

16. To print the mark sheet of n students using structures
17. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array
18. To write a program for find the average of numbers using files
19. To write a program to merge the given two files arguments using command line arguments

UNIX PROGRAMMING

20. Study of Basic UNIX Commands
21. Implement ls Command
22. Write a shell script to determine the properties of a given file
23. Implement grep function
24. Write a shell script to find the factorial of given number
25. Write a shell script to evaluate the given expression using switch-case

SEMESTER -III

		L	T	P	C
MAT201	**MATHEMATICS III** (Common to Bio-Technology, Chemical Engg., Civil Engg., CSE, EEE, EIE and Mechanical Engg.)	**3**	**0**	**0**	**3**

LAPLACE TRANSFORM

Definition of Laplace Transform - Linearity property - condition for existence of Laplace Transform - First and Second Shifting properties - Laplace Transform of derivatives and integrals - Unit step functions - Dirac delta-function - Differentiation and Integration of transforms - Convolution Theorem - Inversion - Periodic functions - Evaluation of integrals by Laplace Transform - Solution of boundary value problems

PARTIAL DIFFERENTIAL EQUATIONS

Formation of PDE - Solution of standard types of first order PDE - Lagrange's linear equation - Linear PDE of second and higher order with constant coefficients

FOURIER SERIES

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine and cosine series - Complex form of Fourier series - Parseval's identity - Harmonic analysis

Z - TRANSFORM

Z-transform - Elementary properties - Inverse Z-transform - Convolution theorem - Formation of difference equation - Solution of difference equation using Z-transform

FOURIER TRANSFORM

Fourier Integral formula - Fourier Transform - Fourier sine and cosine transforms - Linearity, Scaling, frequency shifting and time

shifting properties - Self reciprocity of Fourier Transform - Convolution theorem - Application to boundary value problems

TEXT BOOKS

1. Kreyszig, E, Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 8th Edition, 2001
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Engineering Mathematics Volume II, Scitech Publications (India) Pvt. Ltd., Chennai, 1st Edition, Reprint 2000, 1999

REFERENCES

1. Grewal , B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 37th Edition, 5th Reprint 2004
2. Venkataraman, M. K., Engineering Mathematics -III A, The National Publishing Company, Chennai, 11th Edition, Reprint 2002
3. Venkataraman, M. K., Engineering Mathematics - III B, The National Publishing Company, Chennai, 13th Edition, Reprint 1999

ECE257	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
		3	0	0	3

ELECTRON BALLISTICS AND SEMICONDUCTORS

Classification of devices of an electrical circuit - basic devices - resistors-controlled sources, diode – capacitors – inductors - ideal transformers - semiconductor diode characteristics - semiconductor equations - carrier statistics - poisson's and continuity equations - fermi-dirac statistics and boltzmann approximation to the fermi-drac statistics - semiconductor diodes - barrier formation in metal-semiconductor junctions, PN homo junctions – hetero junctions - some applications of diodes

BJT & FET AMPLIFIERS

Fundamentals of Transistors - biasing circuits for BJT - DC - AC Load linear stability factor analysis - temperature compensation methods - biasing circuits of FET's - MOSFET's - FET - MOSFET amplifiers - analysis & design of CC - CE - CB configurations - RC coupled & transformer coupled multistage amplifiers - frequency response of amplifiers - analysis & design of CS, CD, CG amplifier, thermal runaway in BJT & FET amplifiers

FEEDBACK AMPLIFIERS AND OSCILLATORS

General feed back structure - properties of negative feed back - four basic feed back topologies - series – shunt - series-series - shunt-shunt - shunt-series feedback amplifier - determination of loop gain - stability problem - effect of feedback on amplifier performance - voltage shunt - voltage series - current series - current shunt feedback configurations - concept of stability - nyquist criterion - basic principles of sinusoidal oscillator - RC oscillators – wein bridge and phases half tuned oscillators – collpit - hartley - clap - crystal oscillators

POWER AMPLIFIERS

Type of power amplifiers - Class A amplifier with resistive and transformer coupled load - efficiency of Class B - complementary symmetry amplifiers – MOSFET power amplifiers - heat sinks - switching power amplifiers - harmonic distortion – efficiency - relative performance - cascade amplifier

RECTIFIERS & POWER SUPPLIES

Half-wave - full-wave - bridge rectifiers with resistive load -.analysis for V_{dc} & ripple voltage with filters - voltage multipliers – Zener diode regulator - Electronically regulated d.c power supplies - Line regulation - output resistance - temperature coefficient

TEXT BOOKS

1. Jacob Millman and Christos C. Halkias, Electronic Devices and Circuits, Tata McGraw–Hill, 4th edition, 1998

2. David A. Bell.,Electronic Devices and Circuits, Prentice Hall of India, 3rd Edition, 1998
3. Simon M. Sze, Semiconductor Devices & Technology, John Wiley & Sons (Asia) Pvt. Ltd Wiley publishers., 2nd edition, 2002

REFERENCES

1. Donald A .Neaman, Semiconductor Physics and Devices, Tata McGraw-Hill, 3rd edition, 2002
2. Salivahanan. S., et al., Electronic Devices and Circuits, Tata McGraw Hill , 1st edition, Reprint 2001
3. A.P. Malvino, Electronic Principles, Tata McGraw Hill, 3rd edition, Tata McGraw Hill, New york., 5th edition., 1998

MEC257	THERMODYNAMICS AND FLUID MECHANICS	L	T	P	C
		3	1	0	4

BASIC CONCEPTS AND LAWS OF THERMODYNAMICS

Classical approach - thermodynamic systems – boundary - control volume - system - surroundings – universe – properties - state-process – cycle – equilibrium - work - heat transfer – point - path functions - first law of thermodynamics for open - closed systems - first law applied to a control volume - SFEE equations - second law of thermodynamics - heat engines - refrigerators - heat pumps - carnot cycle - carnot theorem - clausius inequality - concept of entropy - principle of increase of entropy - basic thermodynamic relations

HEAT TRANSFER

One dimensional heat conduction - plane wall – cylinder – sphere - composite walls – critical thickness of insulation –heat transfer through extended surfaces - convection - free convection and forced convection – internal flow - external flow -empirical relations - determination of convection heat transfer co-efficient by using Dittus–Baetter equation - radiation

DEFORMATION OF SOLIDS AND BENDING OF BEAMS

Concept of stress - strain – normal - shear stresses – simple - compound stresses - elasticity - elastic moduli – poison's ratio – concept of shear force - bending moment – bending moment - shear force diagrams for simply supported - cantilever - over hanging beams

SHAFTS AND SPRINGS

Torsion – shear stresses in circular solid - hollow shafts - torque - power – helical - leaf springs – load – deflection - stress - stiffness relationships

FLOW DYNAMICS AND MEASUREMENT IN PIPE AND PUMPS

Euler's - bernoulli's equations – manometer - venturi meter - orifice meter - pressure losses along the flow – categorisation into minor losses - flow through circular pipes – statement of darcy – weisbach equation – friction factor – pipes in series and parallel - hydraulic gradient - classification - centrifugal pumps – impeller blade profiles – cavitation in pumps – pump characteristics – efficiency – reciprocating pumps – classification

TEXT BOOKS

1. Nag, P. K., Basic and Applied Engineering Thermodynamics, Tata McGraw Hill, New Delhi, 2002
2. Sachdeva, B. K., Fundamentals of Engineering Heat and Mass Transfer , New Age International (P) Limited, Chennai, 2003
3. Rogers and Mayhew, Engineering Thermodynamics – Work and Heat Transfer, Addision Wesley, New Delhi, 1999

REFERENCES

1. Eastop and McConkey, Applied Thermodynamics, Addison Wesley, New Delhi,1999
2. Mathur M.L., Metha, F.S., Thermal Engineering, Jain Brothers, New Delhi,1997

3. Sankaar, B. K., Thermal Engineering, Tata McGraw Hill, New Delhi, 1998

EIE201	MEASUREMENT SYSTEM AND TRANSDUCERS	L	T	P	C
		3	0	0	3

SCIENCE OF MEASUREMENT & CHARACTERISTICS OF TRANSDUCERS

Units - standards – calibration methods – static calibration – classification of errors – error analysis – statistical methods – odds and uncertainty - static characteristics – dynamic characteristics – mathematical model of transducers – zero - first-order - second-order transducers – response to standard inputs

VARIABLE RESISTANCE TRANSDUCERS

Principle of operation - construction details - characteristics - applications of resistance potentiometers - strain gauges - resistance thermometers - thermistors - hot-wire anemometer - piezoresistive sensors - humidity sensors

VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCER

Induction potentiometer – variable reluctance transducers – EI pick up – LVDT – capacitive transducers – variable air gap type – variable area type – variable permittivity type – capacitor microphone

SPECIAL TRANSDUCERS

Piezoelectric transducer – Photoelectric transducer - magnetostrictive transducer - digital transducers - fiber optic transducers - Hall effect transducer and its applications

SMART SENSORS

IC sensor - microsensors for mechanical – chemical - biosensing and its applications - sensors for aerospace applications

TEXT BOOKS

1. John P. Bentley, Principles of Measurement Systems, Addison Wesley Longman Ltd., United Kingdom, 3rd edition, 2000
2. Doebelin, E.O., Measurement Systems Application & Design, Tata McGraw Hill Book Co., New Delhi, 5th edition, 2004

REFERENCES

1. Neubert, H.K.P., Instrument Transducers, Introduction to their Performance & Design, Oxford University Press, Cambridge, 2nd edition, 1999
2. Patranabis, D., Sensors and Transducers, Prentice Hall India Pvt Ltd, 2nd edition, 2003
3. Murthy, D.V.S., Transducers and Instrumentation, Prentice Hall of India Pvt. Ltd., New Delhi, 1995
4. Renganathan, S., Transducer Engineering, Allied Publishers, Chennai, 2nd edition, 2004

EEE203	ELECTRIC CIRCUIT ANALYSIS	L	T	P	C
		3	1	0	4

INTRODUCTION TO ELECTRIC CIRCUITS

Laws of Electric circuits – ohms, Kirchoff – network graph – tree and cut sets – cut set and tie set schedule – dual network – matrix representations and solution of AC and DC networks, analysis of AC and DC circuits – mesh, nodal – concept of impedance and admittance – resonance – series , parallel – bandwidth and Q-Factor

NETWORK THEOREMS AND TRANSFORMATIONS

Transformations – voltage and current source – star, delta transformations –theorems – superposition, reciprocity, substitution, maximum power transfer, Thevenin's, Norton's, Tellegan's and Millman's theorems

COUPLED AND THREE PHASE CIRCUITS

Coupled circuits – co–efficient of coupling – self and mutual inductances – analysis of coupled circuits – three phase circuits –

balanced circuits – star and delta connected loads – phase sequence – unbalanced circuits – solution of unbalanced star and delta connected loads – power measurement by two wattmeter method

TRANSIENT ANALYSIS

Source free response – RL, RC & RLC circuits – forced response – RL, RC & RLC circuits – time constant, natural frequency of oscillation of circuits – Laplace transform application – RL, RC & RLC circuits – concept of complex frequency

TWO PORT NETWORKS

Driving point and transfer impedance/admittance – voltage and current ratios of two port networks – admittance, impedance, hybrid, transmission and image parameters for two port networks – impedance matching – equivalent π and T Networks

TEXT BOOK

1. Sudhakar, A., Shyam Mohan ,S.P., Circuits and Network Analysis and Synthesis,Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1994

REFERENCES

1. Dorf R.C., Introduction to Electric Circuits, John Wiley & Sons Inc, New York, Second Edition, 2003.
2. Charles K.Alexander, Mathew N.O. Sadiku., Fundamentals of Electric Circuit, TataMcGraw Hill, N.Y, 2003.
3. Edminister, J.A., Theory and Problems of Electric Circuits, Schaum's outline series TataMcGraw Hill Book Company, 2nd Edition, 1983.

EEE257	CONTROL SYSTEMS	L	T	P	C
		3	1	0	4

INTRODUCTION

Classification of control systems – definitions- open loop - closed loop systems – translational - rotational mechanical systems -

electrical analogous systems – basic components of control systems – potentiometer – synchros – tachogenerator – a.c - d.c servo motor - mathematical representation - block diagram - signal flow graph - transfer function of electrical systems

TRANSIENT AND STEADY STATE ANALYSIS

Transient - steady state response-definitions-mathematical expression for standard test signals-type - order of systems - response of first order and second order systems with standard test signals - time domain specifications - responses of first order systems with p, pi, pid controllers-steady state error analysis – generalized error coefiicients

FREQUENCY RESPONSE ANALYSIS

Frequency response analysis - frequency domain specifications - bode plots - polar plots - -constant m and n circles - nichols chart – gain margin – phase margin

STABILITY ANALYSIS AND COMPENSATORS

Stability analysis – characteristic equation – location of roots in S-plane for stability -Routh's stability criterion- nyquist stability criterion - relative stability analysis - root locus technique – compensators – lag – lead - laglead

STATE SPACE ANALYSIS

Concepts of state – state variable and state models – state equation – state transition matrix – solution of state equation

TEXT BOOKS

1. Katsuhiko Ogata, Modern Control Engineering, Prentice Hall of India Private Ltd, New Delhi, 4th edition, 2002
2. Nagrath, I.J., and Gopal, M., Control Systems Engineering, New Age International Publications, 4th edition, 2006

REFERENCES

1. Benjamin C. Kuo, Automatic Control System, Prentice Hall of India Private Ltd, New Delhi, 5th edition, 2005
2. Richard C. Dorf, Robert H. Bishop, Modern Control System Engineering, Addison Wesley, 3rd edition, 2004

ECE297	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	L	T	P	C
		0	0	3	2

1. Characteristics of PN Junction Diode & Zener diode
2. Transistor Biasing with and without stabilization
3. Input and Output characteristics of Transistor and H parameter evaluation
4. Transistor as an Amplifier
5. FET characteristics and Evaluation of its parameters
6. MOSFET characteristics
7. UJT characteristics
8. IGPT characteristics
9. FET biasing methods
10. BJT and FET as a switch
11. Class B Complementary symmetry power amplifier
12. Half and full wave rectifiers
13. Differential amplifier using BJT
14. Two stage RC coupled amplifier – Frequency response
15. Phase shift oscillator using BJT/FET

EIE281	MEASUREMENTS AND TRANSDUCER LABORATORY	L	T	P	C
		0	0	3	2

1. Measurement of strain using strain gauges
2. Measurement of torque using strain gauges
3. Design strain gauge circuit for signal conditioning
4. Measurement of speed using Electro magnetic transducer
5. Measurement of speed using photoelectric transducers
6. Measurement of speed using stroboscope
7. Study of smart sensors

8. Measurement of natural frequency using Accelerometer
9. Measurement using proximity sensors
10. Measurement of angular displacement using Potentiometer
11. Design of opto coupler using photoelectric transducers
12. Measurement of displacement using LVDT
13. Measurement using load cells
14. Characteristics of Hall effect sensor
15. Measurement using capacitive transducer
16. Measurement using inductive transducer
17. Measurement of pressure using strain gauges
18. Piezo electric transducer
19. Ultrasonic Transducer
20. IC Temperature Sensor

MEC297	THERMODYNAMICS AND FLUID MECHANICS LABORATORY	L	T	P	C
		0	0	3	2

THERMODYNAMICS LAB

1. Valve timing and port timing diagrams for IC Engines
2. Performance test on a Petrol Engine
3. Performance test on a Diesel Engine
4. Heat Balance test on an IC Engine
5. Boiler – performance and Heat Balance Test
6. Performance test on a Refrigerator (Determination of COP)
7. Determination of heat transfer Coefficient (Free and forced convection)

FLUID MECHANICS LABORATORY

1. Flow measurements using venturi meter
2. Test to estimate frictional losses in pipe flow
3. Test on positive displacement pump for obtaining its characteristics curves and design flow parameters
4. Test on centrifugal pump for obtaining its characteristics curves and design flow parameters
5. Test on jet pump for obtaining its characteristics curves and design flow parameters

6. Test on reaction turbine for obtaining the characteristics curves and to design values of specific speed, discharge, output and efficiency
7. Test on impulse turbine to obtain its characteristics curves and hydraulic design values

SEMESTER -IV

	NUMERICAL METHODS	**L**	**T**	**P**	**C**
MAT211	(Common to Civil Engg., EEE, EIE and Mechanical Engg.)	**3**	**0**	**0**	**3**

SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS

Review of open end methods - bracketed end methods - the intermediate theorem (excluding proof) - iterative method - false position method - newton – raphson method for single variable and for simultaneous equations with two variables - solutions of a linear system by gaussian, gauss-jordan - jacobi and gauss – seidel methods - eigen value of a matrix by power method

INTERPOLATION

Newton forward and backward difference formulae - newton's divided difference formulae - Lagrange's polynomials - Stirling's central difference formulae

NUMERICAL DIFFERENTIATION AND INTEGRATION

Numerical differentiation with interpolation polynomials - Numerical integration by Trapezoidal and Simpson's (both 1/3rd and 3/8th) rules - Two and Three point Gaussian quadrature formulae - Double integrals using Trapezoidal and Simpson's rule

INITIAL VALUE PROBLEMS

Single step Methods – Taylor Series, Euler and Modified Euler, Runge – Kutta method of order four for first and second order differential equations - Multistep Methods - Milne's predictor and corrector method

BOUNDARY VALUE PROBLEMS

Finite difference solution for the second order ordinary differential equations - finite difference solution for one dimensional heat

equation (both implicit and explicit) - one-dimensional wave equation - two-dimensional laplace - poisson equations
lab assignments for numerical methods using matlab / c / c++

TEXT BOOKS

1. Kreyszig, E., Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore , 8th edition., 2001
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Numerical Methods, Scitech Publications (India) Pvt. Ltd., Chennai, 2nd edition, Reprint 2006

REFERENCES

1. Jain, M.K., Iyengar, S.R.K., Jain, R.K., Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd., New Delhi, 4th edition, 2003
2. Francis Scheid, Theory and Problems of Numerical Analysis, Schaum's Outline Series, Singapore, 2nd edition, 1989

EIE202	ELECTRICAL AND ELECTRONIC INSTRUMENTATION	L	T	P	C
		3	1	0	4

MEASUREMENT OF VOLTAGE, CURRENT, POWER AND ENERGY

Galvanometers – types – theory – calibration - application – principle - construction, operation - comparison of moving coil - moving iron meters – dynamometer - induction type - thermal type meter - electrodynamometer type - wattmeter-LPF wattmeter – induction type kw-h meter – calibration of wattmeter - energy meter

POTENTIOMETERS & INSTRUMENT TRANSFORMERS

DC potentiometer – basic circuit - standardization – laboratory type (crompton's) – ac potentiometer – drysdale (polar type) type – gall-tinsley (coordinate) type – limitations - applications – C.T and P.T-construction – theory – operation - phasor diagram – characteristics – testing - error elimination – applications

RESISTANCE AND IMPEDANCE MEASUREMENT

Measurement of low resistance - medium resistance - high resistance – ammeter, voltmeter method – wheatstone bridge – kelvin double bridge – ductor ohmmeter – series - shunt type ohmmeter – high resistance measurement – megger a.c bridges – measurement of inductance, capacitance – Q of coil – maxwell bridge – wein's bridge – hey's bridge – schering bridge – anderson bridge – campbell bridge to measure mutual inductance

ELECTRONIC ANALOG METERS AND SIGNAL GENERATORS

D.C, A.C voltmeters – ammeters – multimeter - power meter - q-meter - true rms meter - vector impedance meter - vector voltmeter - component measuring instrument - sine wave generator – frequency synthesized sine wave generator – sweep frequency generator, pulse and square wave generator – function generator

CATHODE RAY OSCILLOSCOPE

General purpose oscilloscope – screens for CRT graticules – vertical - horizontal deflection systems – delay line – multiple trace – dual beam - dual trace – probes – oscilloscope techniques – special oscilloscopes – storage oscilloscopes – sampling oscilloscope – digital CRO

TEXT BOOKS

1. Joseph J. Carr, Elements of Electronic Instrumentation & Measurements, Pearson Education, 3rd edition, 2003
2. Rangan, C. S., et al., Instrumentation Devices and Systems, Tata McGraw-Hill, New Delhi, 2nd edition, 2002
3. Sawhney, A.K., Electrical & Electronic Measurements and Instrumentation, Dhanpath Rai & Co (P) Ltd, 17th edition, 2002

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1. Albert D. Helfrick, William D. Cooper, Modern Electronic Instrumentation & Measurement Techniques, Prentice Hall of India, New Delhi, Reprint 2002

2. Gupta J.B., A Course in Electronic and Electrical Measurements and Instrumentation, S.K. Kataria & Sons, Delhi, Reprint 2003
3. Kalsi, H.S., Electronic Instrumentation, Tata McGraw Hill, New Delhi, Reprint 2003

EIE206	DIGITAL ELECTRONICS	L	T	P	C
		3	1	0	4

NUMBER SYSTEMS AND BOOLEAN ALGEBRA

Review of number systems - representation of signed numbers - floating point number representation - BCD-ASCII-EBCDIC - Excess 3 codes - gray code - error detecting - correcting codes - boolean algebra – postulates - theorems of boolean algebra – canonical forms – simplification of logic functions using Karnaugh map – Quine Mcclausky method

COMBINATIONAL LOGIC DESIGN

Logic gates – implementation of combinational logic functions – encoders & decoders – multiplexers - demultiplexers –code converters – comparator - half adder - full adder – parallel adder – binary adder – parity generator/checker – implementation of logical functions using multiplexers

COUNTERS AND REGISTERS

Flip flops – level triggering - edge triggering – excitation tables – asynchronous & synchronous counters – modulus counters – shift register – Johnson counter - ring counter – timing waveforms - counter applications - sequential logic design - basic models of sequential machines – concept of state table – state diagram – state reduction through partitioning - implementation of synchronous sequential circuits – asynchronous sequential logic design

PROGRAMMABLE LOGIC DEVICES

Semi custom design –PLDs – ROM – PAL – PLA – FPGA – architecture of PLDs - PAL 22V10 - PLS 100/101 – Implementation

of digital functions.- logic families - MOS inverters, CMOS inverters, comparison of performance of various logic families

MEMORY DEVICES

Classification of memories – RAM organization – write operation – read operation – memory cycle - timing wave forms – memory decoding – memory expansion – static RAM cell-bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM – practical applications of memory devices

TEXT BOOKS

1. Morris Mano, M., Digital Design, Prentice Hall of India Pvt. Ltd., New Delhi, 3rd edition, 2003
2. Leach Donald P., Malvino Albert Paul, Digital Principles and Applications , Tata McGraw Hill, New Delhi,5th edition., 2000

REFERENCES

1. Taub and Schilling, Digital Integrated Electronics, Tata Mc Graw Hill, New Delhi, 3rd edition, 1997
2. Salivahanan, S., and Arivazhagan, S., Digital Circuits and Design, Vikas Publishing House Pvt. Ltd, New Delhi, 2nd edition, 2004
3. Donald P.Leach, Albert Paul Malvino, Digital Principles and Applications, Tata McGraw Hill Publishing Company Limited, New Delhi, 5th edition, 2003
4. Jain. R. P., Modern Digital Electronics, Tata McGraw–Hill publishing company limited, New Delhi, 3rd edition, 2003

EEE267	ELECTRICAL MACHINES	L	T	P	C
		3	1	0	4

D.C. MACHINES

Constructional details – emf equation – methods of excitation – characteristics of DC generators – principle of operation of D.C. motor – back emf - torque equation – characteristics of DC motors - starting of D.C. motors – types of starters –testing of DC machines – speed control of D.C.motors

TRANSFORMERS

Constructional details – principle of operation – emf equation – transformation ratio – transformer on no load – parameters referred to HV/LV windings – equivalent circuit – transformer on load – regulation - testing – load test - open circuit - short circuit tests

INDUCTION MOTORS

Construction – types – principle of operation of three phase induction motors – equivalent circuit – performance calculation – starting - speed control – single phase induction motors

SYNCHRONOUS MACHINES

Construction of synchronous machines - types – induced emf – voltage regulation - emf -mmf methods – generator - load characteristics – synchronous motor-torque - speed control methods

SPECIAL MACHINES

Brushless alternators – reluctance motor – hysteresis motor – stepper motors - universal motor

TEXT BOOKS

1. Kothari D. P., Nagrath. I.J., Basic Electrical Engineering, Tata McGraw Hill publishing company ltd, New delhi, 2nd edition, 2002
2. Theraja B.L., Theraja A.K., Electrical Technology –Volume 2, S.Chand & Co.,22nd edition, 2002

REFERENCES

1. Bhattacharya, S.K., Electrical Machines, Tata McGraw Hill Publishing company ltd., 2nd edition, 1998
2. Pillai, S.K., A First Course on Electrical Machines, New Age International, 2nd Edition

CSE 206	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

INTRODUCTION

Basic concepts of OOP – applications of OOP - c++ - c++ stream I/o – declarations in c++ - creating new data types in c++ - function prototypes – inline functions – reference parameters – constant qualifier – dynamic memory allocation – default arguments – unary scope resolution operator – linkage specifications

CLASSES, CONSTRUCTORS AND FRIEND CLASS

Comparing class with structure – class scope – accessing members of a class – constructor – destructor – const objects – const member functions – friend class – friend function – this pointer – data abstraction and information hiding – container classes and iterates

OVERLOADING AND INHERITANCE

Operator overloading – fundamentals – restrictions – overloading stream – insertion and stream extraction operators – overloading unary & binary operators – converting between types – overloading ++ / --. inheritance – introduction – protected members – casting base _class pointers to derived - class pointers – overloading base class members in a derived class – public - protocols and private inheritance – direct base classes - indirect base classes – using constructors and destructors in derived classes – implicit derived class object to base class object conversion

VIRTUAL FUNCTIONS, STREAMS AND FILES

Type fields - switch statements – virtual functions – abstract base

classes - concrete classes – polymorphism – dynamic binding – virtual destructors - c++ stream I/o - streams – stream input – stream output – unformatted I/O – stream manipulators – stream format states – stream error – states – files - file operations –file pointers – error handling during file operations

TEMPLATES AND EXCEPTION HANDLING

Templates – function templates – class templates – overloading template functions – class template - non type parameters – templates with multiple parameters - exception handling - when exception handling – basic of c++ exception – catching an exception – re throwing an exception – exception specifications

TEXT BOOKS

1. Bjarne Struoustrup, The C++ Programming Language, Addison Wesley, 2000
2. John R. Hubbard, Programming with C++, Schaums outline series, Tata McGraw Hill, 2003

REFERENCES

1. Deitel H.M., Deitel P.J., How to program C++, Prentice Hall of India, 2003
2. Venugopal, K.R., Mastering C++, Tata McGraw Hill, 2003

EIE282	ELECTRICAL AND ELECTRONIC MEASUREMENTS LABORATORY	L	T	P	C
		0	0	3	2

1. Wheat Stone bridge
2. Kelvin double bridge
3. Determination of critical damping resistance of a D'Arsonval Galvanometer
4. Tests on a single-phase energy meter
5. Calibration of wattmeter at different power factors
6. Testing of current transformers

7. Calibration of ammeter, voltmeter and wattmeter using student type potentiometer
8. Design, construction and calibration of series and shunt type ohmmeters
9. Operational amplifier applications
10. Regulated power supply using fixed voltage IC regulators and LM 723
11. Frequency response characteristics of CE and CB amplifiers
12. Study of feedback in amplifiers
13. RC phase shift and Wien bridge oscillator
14. Measurement of low, medium & high resistance
15. Measurement of energy meter
16. Measurement of low frequency & high frequency
17. Study of CRO, Function Generator, Dual channel measurement

EIE283	DIGITAL ELECTRONICS LABORATORY	L	T	P	C
		0	0	3	2

1. Realization of Logic gates. (AND, OR, NOT, NAND, NOR, XOR, EXNOR)
2. Adder and Subtractors
3. Code converters. (BCD to 7 segments, BCD to Excess-3, Gray to binary,Binary to Gray)
4. Combinational logic design using Encoders and Decoders.
5. Combinational logic design using Multiplexers and Demultiplexers.
6. Realization of RS, JK, T, D Flip flops circuits
7. Synchronous Counters and Asynchronous Counters
8. Shift registers
9. Parity generation and checking
10. Analog to Digital Converter
11. Digital to Analog Converter
12. Digital Comparator

SEMESTER -V

EIE301	INDUSTRIAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

MEASUREMENT OF FORCE, TORQUE, VELOCITY, ACCLERATION, DENSITY AND VISCOSITY

Electric balance – different types of load cells – different methods of torque measurement – speed measurement - measurement of acceleration, vibration, density and viscosity - calibration of vibration pick-ups

PRESSURE MEASUREMENT

Units of pressure - manometers – different types – elastic type pressure gauges – bourdon type bellows – diaphragms – electrical methods – elastic elements with LVDT and strain gauges – capacitive type pressure gauge – piezoresistive pressure sensor – resonator pressure sensor – measurement of vacuum – mcleod gauge – thermal conductivity gauges – ionization gauge, cold cathode and hot cathode types – testing and calibration of pressure gauges – dead weight tester

TEMPERATURE MEASUREMENT

Calibration of thermometer, different types of filled in system thermometer – sources of errors in filled in systems - their compensation – bimetallic thermometers – electrical methods of temperature measurement – signal conditioning of industrial RTDs and their characteristics – three lead - four lead RTDs - thermocouples and pyrometers - thermocouples – laws of thermocouple – signal conditioning of thermocouples output – thermal block reference functions – commercial circuits for cold junction compensation – response of thermocouple – special techniques for measuring high temperature using thermocouples – radiation methods of temperature measurement – radiation

fundamentals – total radiation - selective radiation pyrometers – optical pyrometer

MEASUREMENT OF FLOW

Theory of fixed restriction valuable head type flow meters –Orifice plate – Venturi tube – Flow nozzle – Dall tube – Pitot tube - Quantity meters - area flow meters - mass flow meters - Positive displacement flow meters –Inferential meter – Turbine flow meter – Rotameter – Angular momentum mass flow meter – Coriolis mass flow meters – Thermal mass flow meters – Volume flow meter plus density measurement – Dynamic weighing method - electrical type flow meter - Principle and constructional details of electromagnetic flow meter – Different types of excitation schemes used – Different types of ultrasonic flow meters – Laser Doppler anemometer systems – Vortex shedding flow meter – Target flow meter – Solid flow rate

LEVEL MEASUREMENT

Gauge glass techniques coupled with photoelectric readout system – Float type level indication – Different schemes – Level switches, level measurement using displacer and torque tube – Bubble system. Boiler drum level measurement – Differential pressure method – Hydra step systems – Electrical types of level gauges using resistance, capacitance, nuclear radiation and ultrasonic sensors

TEXT BOOKS

1. Doebelin. E. O., Measurement Systems – Application and Design, Tata McGraw Hill publishing company, 2003
2. Jain, R.K., Mechanical and Industrial Measurements, Khanna Publishers, New Delhi,1999

REFERENCES

1. Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Company Ltd, 2nd edition, 2005
2. Sawhney, A.K., Sawhney, P., A Course on Mechanical Measurements, Instrumentation , Dhanpath Rai and Co, 12th edition, 2004

3. Nakra, B. C., Chaudary, K.K., Instrumentation Measurement & Analysis, Tata McGraw Hill Publishing Ltd, 2004
4. Singh, S.K., Industrial Instrumentation and Control, Tata McGraw Hill, 2003

EIE302	NETWORK ANALYSIS AND SYNTHESIS	L	T	P	C
		3	0	0	3

S-DOMAIN ANALYSIS

S-domain network - driving point - transfer impedances - their properties - transform network analysis - poles - zeros of network functions – time response from pole-zero plots

FREQUENCY DOMAIN ANALYSIS

Admittance - loci of RLC network - Frequency 3-phase of RLC networks -frequency response from pole – zero - Bode plots

NETWORK TOPOLOGY

Network graph, tree – cut - sets - tie set – cut - set schedules - V-shift - I-shift - primitive impedance - admittance matrices - application to network solutions

TWO-PORT NETWORKS & FILTERS

Characterization of two-port networks parameters - network equivalents -relations between network parameters - analysis of networks - transfer function of terminated two - port networks filters - attenuators - design of constant - k, m-derived - composite filters - qualitative treatment of active filters - butterworth and chebyshev filters

ELEMENTS OF NETWORK SYNTHESIS

Reliability of one-port network -hurwitz polynomials - properties - synthesis of RL, RC and LC one-port networks

TEXT BOOKS

1. Kuo, F.F., Network Analysis and Synthesis, Wiley International Edition, 2nd edition, 1966
2. Paranjothi, S.R., Electric Circuit Analysis, New age International Publishers, 2nd edition, 2000

REFERENCES

1. Van Valkenburg, M.E., Network Analysis, Prentice-Hall of India Private Ltd., New Delhi, Third Edition. 1974
2. Sudhakar, A., Shyammohan, Circuits and Networks Analysis and Synthesis, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 1994

EIE303	LINEAR INTEGRATED CIRCUITS AND ITS APPLICATIONS	L	T	P	C
		3	1	0	4

IC FABRICATION

IC classification - fundamental of monolithic IC technology - epitaxial growth - masking - etching - diffusion of impurities - realisation of monolithic ICs - packaging

CHARACTERISTICS OF OPAMP

Ideal OP-AMP characteristics - DC characteristics - AC characteristics - offset voltage –current - voltage series feedback amplifier – voltage shunt feedback amplifiers - differential amplifier - frequency response of OP-AMP - Basic applications of op-amp – summer - differentiator – integrator

APPLICATIONS OF OPAMP

Instrumentation amplifier – first order - second order active filters - V/I converters - I/V converters – comparators – multivibrators - waveform generators – clippers – clampers - peak detector - S/H circuit - D/A converter - A/D converter – types

SPECIAL ICs

555 Timer circuit – Functional block - characteristics – applications - 566-voltage controlled oscillator circuit - 565-phase lock loop circuit functioning - applications, Analog multiplier ICs

APPLICATION ICs

IC voltage regulators - LM317, 723 regulators - switching regulator - MA 7840 - LM 380 power amplifier - ICL 8038 function generator IC - isolation amplifiers - opto coupler - opto electronic ICs

TEXT BOOKS

1. Ramakant A. Gayakward, Op-amps and Linear Integrated Circuits, Pearson Education, 4th edition, 2003
2. Roy Choudhary, D., Sheil B.Jani., Linear Integrated Circuits, New Age, 2nd edition, 2003
3. Coughlin Robert F. and Driscoll Frederick F., Operational Amplifiers and Linear Integrated Circuits, Prentice-Hall of India Private Ltd, 1992

REFERENCES

1. Jacob Millman, Christos C.Halkias, Integrated Electronics - Analog and Digital circuits system, Tata McGraw Hill, 2003
2. Robert F.Coughlin, Fredrick F.Driscoll, Op-amp and Linear ICs, Pearson Education, New Delhi, 6th edition, 2006
3. David A. Bell, Op-amp & Linear ICs, Prentice Hall of India, New Delhi, 2nd edition, 2006

ECE357	MICROPROCESSOR AND MICROCONTROLLER	L	T	P	C
		3	0	0	3

8085 PROCESSOR

Functional block diagram - signals – memory interfacing – i/o ports - data transfer concepts – timing diagram – interrupt structure - instruction format - addressing modes – assembly language format –

data transfer - data manipulation - control instructions – programming - subroutine instructions stack

ARCHITECTURE OF INTEL

CPU block diagrams - pin diagrams - internal descriptions of –80286 – 386 - 486 – pentium - instruction formats - Intel x86 instruction set - assembler directives

ARITMETIC CO-PROCESSORS

80287 architecture- pin diagram - internal architecture - status register - control register - tag register - instruction set - data transfer - arithmetic comparison - transcendental operations - constant operations - control instructions - interfacing 80287 with 80286 - introduction to 80387 – 80487 - programming examples

8051 MICROCONTROLLER

8051 Microcontroller hardware- I/O pins - ports – circuits - external memory –counters – timers - serial data I/O – interrupts - interfacing to external memory – 8255 – 8051 - instruction set – addressing modes

8051 PROGRAMMING AND APPLICATIONS

Assembly language programming – I/O port programming - timer - counter programming – serial communication – interrupt programming –8051 interfacing - LCD – ADC – sensors - stepper motors - keyboard - DAC -PIC microcontroller

TEXT BOOKS

1. Ramesh S. Goankar, Microprocessor Architecture, Programming & Applications with 8085, Penran Interational publishing house, 3rd edition.2002
2. Tabak D., Advanced Microprocessors, Tata McGraw Hill, New Delhi, 2nd edition, 2001

REFERENCES

1. Hall D.V., Microprocessors & Interfacing, Tata McGraw Hill, New Delhi,2nd edition, 1992
2. Brey B.B., The Intel Microprocessors, Prentice-Hall of India Private Ltd., New Delhi, 4th edition, 2003

EIE381	LINEAR INTEGRATED CIRCUITS LABORATORY	L	T	P	C
		0	0	3	2

1. Measurement of Op-amp Parameters
2. Determination of Frequency response of Op-Amp
3. Operational Amplifier applications using single phase & dual phase supply
4. 2 stage and 3 stage Instrumentation Amplifier
5. Open Loop operation of Op-amp -Comparators - Zero crossing detector – Schmitt Trigger
6. Astable Mutivibrator using op-amp - Square, Triangular and rectangular Wave Generators
7. Sinusoidal Oscillators - RC Phase shift and Wien Bridge
8. Astable and Monostable Multi vibrators using 555 IC Timer
9. IC Voltage Regulator
10. Calibration of RTD using Bridge amplifier circuit
11. Calibration of Thermistor using Bridge amplifier circuit

EIE382	INDUSTRIAL INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	2

1. Design of temperature transmitter using RTD
2. Design of cold junction compensation circuit
3. Design of IC temperature transmitter
4. Design of Linearization circuit for thermistor
5. Design of pressure transmitter
6. Performance evaluation of pressure gauges using Dead weight tester
7. Measurement of level using capacitance probe, differential pressure transmitter

8. Design of alarms and annunciators
9. Measurement of pH, conductivity and turbidity
10. Characteristics of I/P and P/I
11. Measurement of flow using orifice, electro magnetic and positive displacement flowmeters
12. Study of HART protocol, Study of MOD bus

SEMESTER -VI

EIE304	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	1	0	4

REPRESENTATION OF SIGNALS

Continuous - discrete time signals - classification of signals - discrete time signals and systems – properties-analog to digital converter – digital to analog convertor

DISCRETE TIME SYSTEMS

Computation of impulse response - transfer function using z transform - z-transform definition – region of convergence – properties of roc – properties of z-transform -inverse z-transform – convolution – linear convolution –circular convolution – overlap add method - over lap save method

DFT AND FFT

DFT - DTFT Properties - Introduction to Radix 2 FFT's – decimation in time FFT algorithm – decimation in frequency FFT algorithm – computing inverse DFT using FFT

IIR AND FIR FILTER DESIGN

Classification – reliability constrains – IIR design – bilinear transform method – impulse invariant method – step – invariance method – FIR design – Fourier series method – window function method

DIGITAL SIGNAL PROCESSORS

Introduction to DSP architecture – Harvard architecture - Dedicated MAC unit - Multiple ALUs, Advanced addressing modes, Pipelining, Overview of instruction set of TMS320C5X and C54X. (Simulations of Digital signals, DFT, FFT, filters in matlab) – Application – Audio processing – Image processing

TEXT BOOKS

1. John G. Proakis, Dimtris G. Manolakis, Digital Signal Processing Principles, Algorithms and Application, Prentice Hall of india, New Delhi, 3rd Edition, 2000
2. Venkataramani, B., and Bhaskar, M., Digital Signal Processor Architecture, Programming and Application, Tata McGraw-Hill, New Delhi 2002
3. Texas Instruments -Manuals

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1. Salivahanan, S., Vallavaraj, A. and Gnanapriya, Digital Signal Processing, McGraw-Hill, New Delhi, 3rd edition, 2006
2. Johny R., Johnson., Introduction to Digital Signal Processing, Prentice Hall, New Delhi 1984
3. Oppenheim A. V., Schafer R. W., Digital Signal Processing, Prentice Hall of India, New Delhi, 2nd edition, 2006

EIE305	POWER ELECTRONICS	L	T	P	C
		3	1	0	4

SINGLE PHASE AND THREE PHASE CONTROLLED RECTIFIERS

Half controlled - fully controlled thyristor - bridge converters –R - RL - RLE loads – continuous - discontinuous current operations- evaluation of performance parameters – harmonics - ripple - input power factor

THREE PHASE

Half controlled - fully controlled thyristor bridge converters –R - RL - RLC loads - continuous - discontinuous current operations - evaluation of performance parameters – harmonics - ripple - input power factor

PERFORMANCE

Effects of source inductance - power factor improvement techniques

- twelve pulse converters - dual converters - design of converter circuits

INVERTERS

Single phase - three phase bridge inverters with R - RL - RLC loads - voltage control - harmonic reduction - rectifier mode of operation - current source inverters - inverter circuit design resonant pulse converters-series - parallel resonant inverters - zero current - zero voltage switching resonant converters - two quadrant zero voltage switching resonant converters - resonant dc link inverters

CHOPPER CIRCUITS AND CYCLO CONVERTERS

Step down DC chopper with R - RL - RLC loads - control strategies - continuous - discontinuous current operations - two quadrant and four-quadrant DC chopper - multiphase dc chopper - switching mode regulators - buck – boost - buck-boost - cuk regulators - chopper circuit design - cyclo converters - principle of operation - envelope - phase controlled cyclo converters - single phase - three phase versions - circulating current - circulating current free mode of operation - effect of source inductance - advantages - disadvantages of cyclo converters

TEXT BOOKS

1. Muhammad H. Rashid, Power Electronics - Circuits, Devices and Applications, Prentice -Hall of India Private Ltd., New Delhi, 2nd Edition, 1994
2. Ned Mohan et.al., Power Electronics- Converters, Applications and Design, John Wiley & Sons (Asia) Private Ltd., Singapore, 1996

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1. Joseph Vithayathil, Power Electronics - Principles and Applications, McGraw Hill Inc., New York, 1995
2. Vedam Subrahmanyam, Power Electronics, New Age International (P) Limited, New Delhi, 1996

EIE306	PROCESS DYNAMICS AND CONTROL	L	T	P	C
		3	1	0	4

INTRODUCTION

Need for process control – mathematical model of first – order level - pressure - thermal processes – higher order process – interacting - non-interacting systems – continuous - batch process – self-regulation – servo and regulator operation

CONTROL ACTIONS AND CONTROLLERS

Basic control actions – characteristics of on-off - proportional - single-speed floating - integral - derivative control modes – P+I-P+D - P+I+D control modes – pneumatic - electronic controllers to realize various control actions

OPTIMUM CONTROLLER SETTINGS

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

MULTILOOP CONTROL

Feed forward control – ratio control- cascade control – inferential control – split range control – introduction to multivariable control – examples from distillation column - boiler systems

FINAL CONTROL ELEMENT

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

TEXT BOOKS

1. Stephanopoulis, G., Chemical Process Control, Prentice Hall of India, New Delhi, 2nd edition, Reprint 2002

2. Eckman, D.P., Automatic Process Control, Wiley Eastern Ltd., New Delhi, 1993

REFERENCES

1. Harriott, P., Process Control, Tata McGraw Hill Publishing Co., New Delhi, 1991
2. Shinkey, Process Control Systems., IV Edition., Tata McGraw Hill, New Delhi, 1996

EIE383	PROCESS CONTROL LABORATORY	L	T	P	C
		0	0	3	2

1. Experimental study of PID controller response on a level loop
2. Experimental study of ON-OFF and P- controller responses on temperature loop
3. Tuning of controllers on a pressure loop
4. Control valve characteristics with and without positioner
5. Modeling of flow process
6. Study of complex control systems (Ratio, Feedforward, and Cascade).
7. Operation of interacting and non-interacting systems
8. Responses of different order processes with and without transportation lag
9. Study of basic logic operations, timer, counter, arithmetic operations in PLC
10. Programming in PLC

The following experiments will be conducted on virtual DCS

11. Three – element boiler control
12. Binary distillation column control
13. Level control in coupled tanks
14. Pressure control in different sized vessels
15. Heat exchanger control
16. Control of rotary dryer

ECE397	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	L	T	P	C
		0	0	3	2

List of Experiments

1. Write a program using 8085 and verify for:
   a. Addition of two 8-bit numbers.
   b. Addition of two 8-bit numbers (with carry).
2. Write a program using 8085 and verify for:
   a. 8-bit subtraction (display borrow),
   b. 16-bit subtraction (display borrow)
3. 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
4. Write a program using 8085 for multiplication of two 8- bit numbers by bit rotation method and verify
5. Write a program using 8085 for division of two 8- bit numbers by repeated subtraction method and test for typical data
6. Write a program using 8085 for dividing two 8- bit numbers by bit rotation method and test for typical data
7. Study of 8086 microprocessor kit
8. Write a program using 8086 for division of a defined double word by another double word division and verify
9. Write a program using 8086 for finding the square root of a given number and verify
10. Write a program using 8086 for copying 12 bytes of data from source to destination and verify
11. Write a program using 8086 and verify for:
    a. Finding the largest number from an array.
    b. Finding the smallest number from an array
12. Write a program using 8086 for arranging an array of numbers in descending order and verify
13. Write a program using 8086 for arranging an array of numbers in ascending order
14. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor and 8255 PPI

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

SEMESTER -VII

EIE401	ANALYTICAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

COLORIMETRY AND SPECTROPHOTOMETRY

Special methods of analysis – beer-lambert law – colorimeters – UV-Vis spectrophotometers – single - double beam instruments – sources - detectors – IR spectrophotometers – types – attenuated total reflectance flame photometers – atomic absorption spectrophotometers – sources - detectors – FTIR spectrophotometers – flame emission photometers

CHROMATOGRAPHY

Different techniques – gas chromatography – detectors – liquid chromatographs – applications – high-pressure liquid chromatographs – applications

INDUSTRIAL GAS ANALYZERS AND POLLUTION MONITORING INSTRUMENTS

Types of gas analyzers – oxygen - NO_2 - H_2S types - IR analyzers - thermal conductivity analyzers - analysis based on ionization of gases - air pollution due to carbon monoxide – hydrocarbons - nitrogen oxides - sulphur dioxide estimation - dust and smoke measurements

PH METERS AND DISSOLVED COMPONENT ANALYZERS

Principle of pH measurement - glass electrodes - hydrogen electrodes - reference electrodes - selective ion electrodes - ammonia electrodes – biosensors - dissolved oxygen analyzer – Sodium analyzer – Silicon analyzer

RADIO CHEMICAL AND MAGNETIC RESONANCE TECHNIQUES

Nuclear radiations – detectors – GM counter – proportional counter –

solid state detectors – gamma cameras – X-ray spectroscopy – detectors – diffractometers – absorption meters – detectors - nmr – basic principles – nmr spectrometer – applications - mass spectrometers – different types – applications

TEXT BOOKS

1. Willard H. H., et al., Instrumental Methods of Analysis, CBS publishing & distribution, 7th edition, 1995
2. Ewing, G. W., Instrumental Methods of Analysis, McGraw Hill, New Delhi, 5th edition.,1992
3. Khandpur, R. S., Handbook of Analytical Instruments, Tata McGraw Hill publishing Co. Ltd., New Delhi, 2003

EEE457	NEURAL NETWORK AND FUZZY LOGIC CONTROL	L	T	P	C
		3	0	0	3

ARCHITECTURES

Biological neuron – artificial neuron – neuron modeling – learning rules – single layer – multi layer feed forward network – back propagation – learning factors

NEURAL NETWORKS FOR CONTROL

Feedback networks – discrete time hop field networks – transient response of continuous time networks – applications of artificial neural network - process identification – neuro controller for inverted pendulum

FUZZY SYSTEMS

Classical sets – fuzzy sets – fuzzy relations – fuzzification – defuzzification – fuzzy rules

FUZZY LOGIC CONTROL

Membership function – knowledge base – decision-making logic – optimisation of membership function using neural networks – adaptive fuzzy system – genetic algorithm

APPLICATION OF FLC

Fuzzy logic control – inverted pendulum – image processing – home heating system – blood pressure during anesthesia – introduction to neuro fuzzy controller

TEXT BOOKS

1. Jacek M. Zurada, Introduction to Artificial Neural Systems, Jaico Publishing home, 2002
2. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Tata McGraw Hill, 1997

REFERENCES

1. Laurance Fausett and Englewood cliffs, N.J., Fundamentals of Neural Networks, Pearson Education, 1992
2. Zimmermann, H.J., Fuzzy Set Theory & its Applications, Allied Publication Ltd., 1996
3. Simon Haykin, Neural Network, Pearson Education, 2003
4. John Yen, Reza Langari, Fuzzy Logic – Intelligence Control & Information, Pearson Education, New Delhi, 2003

EIE481	VIRTUAL INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	2

1. Development of virtual instrument using GUI
2. Development of Sub VI's
3. Measurement and logging of a process data and generating a report
4. Measurement of vibration of a given structure and analyzing the data
5. Measurement of strain of a given structure and publishing it in the web
6. System simulation and design
7. Instrument Control
8. Control of Temperature using Multifunction RT data acquisition card

9. Control of a given process using Real Time Embedded controller
10. Control of temperature using distributed input/output model
11. Control of a given process using fieldbus
12. Interfacing a PLC to a network

MAJOR ELECTIVES

EIE307	PROGRAMMABLE LOGIC CONTROLLERS	L	T	P	C
		3	0	1	4

INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER

Study the history of development - examples of early applications - review of common computer mathematical functions - digital logic gates

MAIN ELEMENTS OF THE PLC SYSTEM

CPU - memory maps - single bit I/O modules - Power Supplies

PLC PROGRAMMING

Equipment – formats - ladder diagrams – scanning - Programming On/Off Inputs to produce On-Off Outputs - Basic PLC Programming

PROGRAM USING REGISTER FUNCTIONS

Input - output registers - timer - counter functions - understand PLC arithmetic functions - square root - comparisons creation of ladder diagrams for process-control

APPLICATIONS

Skip - Master Control Relay Functions - Interlocks Data Move Systems - Real time control using PLC - PID function in PLC - Soft PLC's, Lab Exercises

TEXT BOOKS

1. John W.Webb and Ronald A Reis, Programmable Logic Controllers - Principles and Applications, Prentice Hall, New Jersey, 2nd edition, 1998
2. Frank D. Petruzella, Programmable Logic Controllers, McGraw Hill, Newyork, 2nd edition, 1997

REFERENCES

1. Curtis D. Johnson, Process Control Instrumentation Technology, Prentice Hall, New Delhi, 7th edition, 2002
2. Stenerson J., Fundamentals of Programmable Logic Controllers, Sensors and Communications, Prentice Hall, 1998
3. Michel G. and Duncan, F., Programmable Logic Controllers: Architecture and Application, John Wiley & Sons Pvt ltd., 1990
4. Carrow, R.A., Soft Logic: A Guide to Using a PC as a Programmable Logic Controller, Tata McGraw Hill, New Delhi, 1997

EIE308	COMPUTER CONTROL OF PROCESS	L	T	P	C
		3	0	1	4

ANALYSIS OF DISCRETE DATA SYSTEM

Basic building blocks of computer control system - SCADA – direct digital control -selection of sampling process – selection of sampling period – review of z-transform – pulse transfer function

DESIGN OF DIGITAL CONTROLLER

Digital PID – position and velocity form – deadbeat's algorithm – dahlin's algorithm– kalman's algorithm - modified z-transform – predictive control algorithm

COMPUTER AS A CONTROLLER

Data acquisition systems - introduction to AI - expert control system – fuzzy logic control -design of computerized temperature control loop – pressure control loop – level control loop

HART AND FIELD BUS

Evolution of signal standards – HART communication protocol – communication modes – HART networks – control system interface – HART - OSI model – filed bus introduction – general field bus architecture – basic requirements of field bus standard – field bus topology – inter operability

INTRODUCTION TO PLC, DCS, & SCADA

Definition - overview of PLC systems - input/ output modules - power supplies –ISO slots - general PLC programming procedures - programming on-off outputs - auxiliary commands - functions - creating ladder diagrams from process control descriptions - DCS & SCADA- basic functions - evolution – architectures – comparison – local control unit – process interfacing issues – communication facilities

TEXT BOOKS

1. Deshpande, P.B. and Ash, R.H., Computer Process Control, ISA Publication, USA, 1999

REFERENCES

1. Tanenbaum, A.S. ,Computer Networks, Pearson Education, New Delhi, 6th edition, 2004
2. Michael P. Lukas, Distributed Control System, Van Nostrand Reinhold Co., Canada, 1986

EIE309	PROCESS COMPONENTS DESIGN	L	T	P	C
		3	0	0	3

SENSOR DESIGN

Systems performance - specifications – compensators – methodologies – assessment

CLASSICAL CONTROLLERS DESIGN

Proportional – integral – derivatives – PI – PD – PID controllers – characteristics – design – tuning - manual and automatic

FREQUENCY DOMAIN DESIGN

Design of lag, lead - lead-lag compensators – design using bode plots – polar plots – nichols charts – MIMO design.

STATE VARIABLE DESIGN

Design by state feedback – output feedback – pole assignment

technique – design of state - output regulators – design of reduced - full order observers – introduction to robust control - h∞ control – parameter optimization

CASE STUDIES

Radar tracking – Control of robot arm – Satellite altitude control – Temperature control

TEXT BOOKS

1. Thompson, S., Control Systems Engineering and Design, Longman group, U.K.Ltd., 1989
2. Doebelin, E.O., Control Systems Principles and Design, John Wiley and sons, 1990

REFERENCE BOOKS

1. Nagrath I.J. and Gopal, M., Control Systems Engineering, New age international publishers, 2003
2. Gopal, M., Modern Control Systems Theory, Wiley Eastern Ltd, 1993

EIE310	INDUSTRIAL DRIVES AND CONTROL	L	T	P	C
		3	0	1	4

INTRODUCTION

Basic Elements – types of electric drives – factors influencing the choice of electrical drives – heating - cooling curves – loading conditions - classes of duty – selection of power rating for drive motors with regard to thermal overloading - load variation factors

DRIVE MOTOR CHARACTERISTICS

Mechanical characteristics – speed-torque characteristics of various types of load - drive motors – braking of electrical motors – dc motors - single phase - three phase induction motors

STARTING METHODS

Types of D.C Motor starters – typical control circuits for shunt

motors - series motors – three phase squirrel cage - slip ring induction motors

CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C DRIVES

Speed control of DC series - shunt motors – armature control - field control - ward-leonard control - controlled rectifiers - DC choppers – applications

CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES

Speed control of three phase induction motor – Voltage control - voltage / frequency control - slip power recovery scheme – inverters - AC voltage regulators – IGBT - applications

TEXT BOOKS

1. Vedam subrahmaniam, Electric Drives, Tata Mcgraw-Hill, New Delhi, 2001
2. Nagrath, I.J. and Kothari, D.P., Electrical Machines, Tata Mcgraw-Hill, New Delhi 1998
3. Pillai, S.K., A first course on electric drives, Wiley Eastern Limited, 1998

REFERENCES

1. Partab, H., Art and science and utilisation of electrical energy, Dhanpat rai and Sons, 1994
2. Rashid Muhammad H., Power Electronics, Circuits, Devices and Applications, Pearson Education Private Limited, 2nd edition, 2002

EIE311	PROCESS MODELING AND SIMULATION	L	T	P	C
		3	0	1	4

BASIC MODELING PRINCIPLES

Mathematical models for chemical engineering systems - analog simulation - digital simulation - time-domain dynamics - frequency-domain dynamics - process identification

STIRRED TANK HEATERS

Absorption-isothermal - continuous stirred tank - chemical reactors - biochemical reactors - adiabatic continuous stirred tank reactor - ideal binary distillation columns

SECOND ORDER SYSTEM

Pole-Zero cancellation- system in series – blocks in parallel - linear boundary value problems - parameter estimation of discrete linear systems - phase-plane analysis- generalization of phase-plane behavior - nonlinear systems - bifurcation behavior of systems models

SIMULATION OF START-UP TRANSIENT PROBLEMS

Dynamic model of a distillation column - computer simulation - state material - heat balances - simulation of heat - mass transfer equipment - chemical reactors

SIMULATION TECHNIQUES

Process design - integrated chemical plants - processes - application of simulation packages

TEXT BOOKS

1. Luyben W.L., Process Modelling, Simulation and Control for Chemical Engineers, McGraw Hill International edition, 2nd edition, 1990
2. Smith C.A. and Corripio A.B., Principles and practice of automatic process control, John Wiley & Sons, 1985

REFERENCES

1. Ingham J., Chemical Engineering Dynamics - Modelling with PC simulation, John Wiley & Sons, 1994
2. Peter harriott., Process Control, Tata Mcgraw hill, New Delhi, 2002

EIE312	COMMUNICATION ENGINEERING	L	T	P	C
		3	0	0	3

MODULATION SYSTEMS

Time - frequency domain representation of signals - amplitude modulation – demodulation - frequency modulation – demodulation - super heterodyne radio receiver - frequency division multiplexing - pulse width modulation

TRANSMISSION MEDIUM

Transmission lines – types - equivalent circuit - losses, standing waves - impedance matching – bandwidth - radio propagation – ground wave - space wave propagation - critical frequency - maximum usable frequency - path loss - white gaussian noise

DIGITAL COMMUNICATION

Pulse code modulation - time division multiplexing - digital T-carrier system - digital radio system - digital modulation - frequency - phase shift keying – modulator – demodulator - bit error rate calculation

DATA COMMUNICATION AND NETWORK PROTOCOL

Data communication codes - error control - serial - parallel interface - telephone network - data modem – ISDN – LAN - ISO-OSI seven layer architecture for WAN

SATELLITE AND OPTICAL FIBRE COMMUNICATIONS

Orbital satellites - geostationary satellites - look angles - satellite system link models - satellite system link equations - advantages of optical fibre communication - light propagation through fibre - fibre loss - light sources and detectors

TEXT BOOKS

1. Wayne Tomasi, Electronic Communication Systems, Pearson Education, 3rd edition, 2001
2. Roy Blake, Electronic Communication Systems, Thomson Delmar Publishers, 2nd edition, 2002

REFERENCES

1. William Schweber, Electronic Communication Systems, Prentice Hall of India, 2002
2. Kennedy, G., Electronic Communication Systems, McGraw Hill, 4th edition, 2002
3. Miller, Modern Electronic Communication, Prentice Hall of India, 2003

EIE313	POWER PLANT INSTRUMENTATION AND CONTROL	L	T	P	C
		3	0	0	3

OVERVIEW OF POWER GENERATION

Brief survey of methods of power generation-hydro - thermal, nuclear - solar - wind power – importance of instrumentation in power generation – thermal power plants – building blocks – details of boiler processes - PI diagram of boiler –cogeneration

MEASUREMENTS IN POWER PLANTS

Electrical measurements - non-electrical parameters – flow of feed water, fuel - air - steam with correction factor for temperature – steam pressure - steam temperature-drum level measurement – radiation detector – smoke density measurement – dust monitor

ANALYZERS IN POWER PLANTS

Flue gas oxygen analyser – analysis of impurities in feed water - steam – dissolved oxygen analyser – chromatography – pH meter-fuel analyser – pollution monitoring instruments

CONTROL LOOPS IN BOILER

Combustion control – air/fuel ratio control – furnace draft control – drum level control – main steam - reheat steam temperature control – super heater control – attemperator – deaerator control – distributed control system in power plants-interlocks in boiler operation

TURBINE-MONITORING AND CONTROL

Speed - vibration, shell temperature monitoring - control-steam pressure control – lubricant oil temperature control – cooling system

TEXT BOOKS

1. Sam G. Dukelow, The control of Boilers, Instrument Society of America, 1991
2. Jain, R. K., Mechanical and industrial Measurements, Khanna Publishers, New Delhi, 1995

REFERENCE

1. Elonka, S.M. and Kohal A.L., Standard Boiler Operations, McGraw Hill, New Delhi, 1994

EIE314	VLSI DESIGN	L	T	P	C
		3	0	0	3

BASIC DEVICE CHARACTERISTICS

NMOS - PMOS - CMOS devices characteristics - linear, saturation modes - bulk effect capacitance - device models for simulation - CMOS device fabrication principles

BASIC CIRCUITS DIGITAL SYSTEMS

CMOS inverter - design principles – design layout rules - construction of multiplexers - transmission gates – latches - flip flops - timing - fan-out considerations

BUILDING BLOCKS OF DIGITAL SYSTEMS

Combinational logic - sequential logic circuits - data path circuits - adder multiplier architecture - accumulators

PROGRAMMABLE LOGIC DEVICES AND FPGAs

Programmable logic interconnect principles – types - programmable logic elements - AND-OR arrays - routing procedures in FPGAs and CPLD - programming methods for FPGAs and CPLDs - Comparison of ACTEL, Altera AND Xilinx FPGAs

PRINCIPLES OF HDL

Introduction to VHDL – sequential - concurrent descriptions - signal, port and variable statements - wait, case - other sequential statements - block, process component and generate descriptions - test branch creation - principles of operation of VHDL simulator – verilog - brief comparison with VHDL

TEXT BOOKS

1. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, Tata McGraw-Hill, New Delhi, 2005

REFERENCES

1. Smith, M.J., Application Specific Integrated Circuits Addison Wesley Press, 1999
2. Weste, N.H.E. and Ershingian, K., Principles of CMOS VLSI Design: A Design Perspective, Addison Wesley, 1996
3. Chales H. Roth Jr., Digital System Design using VHDL, Thomson Asia Pte. Bhasker, J., VHDL Primer, Prentice Hall 1995

EIE315	VIRTUAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

REVIEW OF VIRTUAL INSTRUMENTATION

Historical perspective – advantages - block diagram - architecture of a virtual instrument

DATA – FLOW TECHNIQUES

Graphical programming in data flow - comparison with conventional programming

VI PROGRAMMING TECHNIQUES

VIs - sub-VIs - loops – charts – arrays - clusters – graphs - case - sequence structures formula nodes - local - global variables - string - file I/O

DATA ACQUISITION AND INSTRUMENT INTERFACE

ADC – DAC – DIO - counters – timers - PC hardware structure – timing – interrupts – DMA - software - hardware installation - current loop - RS 232/RS485 – GPIB - USB - PCMCIA

ANALYSIS TOOLS AND APPLICATION

Some tools from the advanced analysis tools revalent to the discipline may be included e.g. fourier transform - power spectrum - correlation methods – windowing – filtering - VI applications in various fields – visa and ivi – image acquisition – processing

TEXT BOOKS

1. Gary Johnson, Lab View graphical programming, McGraw Hill, New york, 2nd edition, 1997
2. Lisa K. Wells and Jeffrey Travels, Lab View for everyone, Prentice Hall, New Jersey, 1997

REFERENCES

1. Gupta, S. and Gupta, J.P., PC interfacing for Data Acquisition & Process Control, Instrument Society of America, 2nd edition, 1994
2. Kevin James, PC Interfacing and Data Acqusition Techniques for Measurement, Instrumentation and Control., New Nes, 2000

EIE316	TELEMETRY AND TELECONTROL	L	T	P	C
		3	0	0	3

TELEMETRY FUNDAMENTALS CLASSIFICATION

Fundamental concepts – significance – principle - functional blocks of telemetry - tele control system - methods of telemetry - electrical – pneumatic - hydraulic - optical telemetry - state of the art-telemetry standards

LANDLINE TELEMETRY

Electrical telemetry - current systems - voltage systems synchro

systems - frequency systems - position - pulse systems-example of a landline telemetry system

RADIO TELEMETRY

Block diagram of a radio telemetry system transmitting - receiving techniques -AM,FM,PM multiplexing - transmitting - receiving techniques - digital coding methods advantages of PCM,PWM,PPM,FSK - delta modulation coding - decoding equipment - example of a radio telemetry system

OPTICAL TELEMETRY

Optical fibres for signal transmission -sources for fiber optic transmission - optical detectors - trends in fibre optic device development-example of an optical telemetry system

TELE CONTROL METHODS

Analog - digital techniques in tele control - tele control apparatus - remote adjustment. guidance - regulation tele control using information theory - example of a tele control system

REFERENCES

1. Patranabis, D., Telemetry Principles, Tata McGraw Hill, NewDelhi, 1999
2. Swoboda, G., Telecontrol Methods and Applications of Telemetry and Remote Control, Reinhold Publishing Corp., London, 1991

EIE317	DIGITAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

INTRODUCTION

Digital codes – memory devices – basic building blocks – gates, ff - counters – discrete data handling – sampling – sampling theorem – aliasing errors – reconstruction – extrapolation – synchronous - asynchronous sampling

DIGITAL METHODS OF MEASUREMENTS

Review of A/D - D/A techniques – F/V - V/F conversion techniques – digital voltmeters and multimeters – automation - accuracy of digital voltmeters - multimeters – digital phase meters – digital tachometers – digital frequency, period - time measurements – low frequency measurements – automatic time - frequency scaling – sources of error – noise – inherent error in digital meters, hidden errors in conventional ac measurements – RMS detector in digital multimeters – mathematical aspects of RMS

DIGITAL DISPLAY AND RECORDING DEVICES

Digital storage oscilloscopes – Digital printers - plotters – CDROMS – Digital magnetic tapes - dot matrix - LCD display CROs - colour monitor - digital signal analyser - digital data acquisition

SIGNAL ANALYSIS

Amplifiers – filters – transmitter – receiver - wireless base - mobile station test sets - noise figures meters - RF network analyser - high frequency signal sources

CURRENT TRENDS IN DIGITAL INSTRUMENTATION

Special function add on cards – resistance card – input - output cards – counter, test - time of card - digital equipment construction with modular designing - interfacing to microprocessor - micro controllers - computers - computer aided software engineering tools (CASE) – use of case tools in design - development of automated measuring systems – interfacing IEEE cards – intelligent - programmable instruments using computers

TEXT BOOK

1. Bouwens, A.J., Digital Instrumentation, Tata Mcgraw hill, 2nd edition, 1997

REFERENCES

2. John Lenk, D., Handbook of Micro computer based Instrumentation and Control,1984

3. Doebelin, Measurement System, Application & Design, Tata McGraw-Hill, 4th edition, 2002

EIE318	INDUSTRIAL CHEMICAL PROCESS	L	T	P	C
		3	0	0	3

MECHANICAL OPERATIONS

Unit operations - transport of liquids - solids - gases adjusting particle size of bulk solids – mixing processes – separation processes

MASS TRASFER OPERATIONS PROCESSES

Combustion processes – heat exchangers– evaporators – crystallization - Drying – distillation – refrigeration process – chemical reactions – energy balance and material balance for the above processes

HEAT TRANSFER OPERATIONS

Radiation – conduction – convection -Total Balance - Heat Balance - Heat Effects - combustion reactions - Energy balances in manufacturing processes - optimum utilization of Energy - Heat Transfer Operations in Chemical reactors - equipments

CASE STUDY – I

Operations in the manufacture of paper and pulp – operations in steel industry

CASE STUDY – II

Operations in thermal power plant – operations in pharmaceutical industry - lather industry

TEXT BOOKS

1. Waddams, A.L., Chemicals from petroleum, Butler and Tanner Ltd., UK, 1968
2. Balchen, J.G. and Mumme, K.J., Process Control structures and applications, Van Nostrand Reinhold Co., New York, 1988

REFERENCES

1. Austin, G.T. and Shreve's, Chemical Process industries, McGraw-Hill International student edition, Singapore, 1985
2. Liptak, B.G., Process measurement and analysis, Chilton Book Company, USA, 1995
3. Luyben W.C., Process Modelling, Simulation and Control for Chemical Engineers, McGraw-Hill International edition, USA, 1989

EIE319	PIPING AND INSTRUMENTATION DIAGRAMS	L	T	P	C
		3	0	0	3

FLOW SHEET DESIGN

Types of flowsheets - flow sheet presentation - flow sheet symbols - line symbols – designation - process flow diagram - synthesis of steady state flowsheet - flowsheeting software

PIPING AND INSTRUMENTATION DIAGRAM EVALUATION AND PREPARATION

P and I Symbols - line numbering, line schedule - P & I development - various stages of P and ID-P and ID for pumps - compressors process vessels – absorber - evaporator

CONTROL SYSTEMS AND INTERLOCKS FOR PROCESS OPERATION

Need of interlock - types of interlocks - interlock for pumps – compressor - heater-control system for heater - distillation column - expander

INSTRUMENT LINE DIAGRAM

Line diagram symbols - logic gates - representation of line diagram

APPLICATION OF P AND ID'S

Applications of P and ID in design state - construction stage - commissioning state - operating stage revamping state - applications of P and ID in HAZAPS and risk analysis

TEXT BOOKS

1. Ernest E. Ludwig, Applied Process Design for Chemical and Petrochemical Plants Vol-I, Gulf Publishing Company, Houston, 1989
2. Max S. Peters and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers, 4th Edition, McGraw Hill Inc., New York, 1991

REFERENCES

1. Anil Kumar, Chemical Process Synthesis and Engineering Design, Tata McGraw Hill, New Delhi, 1982
2. Westerberg A.N., et al., Process Flow sheeting, Cambridge University Press, New Delhi, 1979

EIE320	REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

SYSTEM DESIGN

Definitions - Classifications and brief overview of microcontrollers - microprocessors and DSPs - Embedded processor architectural definitions - Typical application scenarios of embedded systems

INTERFACE ISSUES RELATED TO EMBEDDED SYSTEMS

A/D - D/A converters – timers – actuators – power – FPGA – ASIC - diagnostic port

TECHNIQUES FOR EMBEDDED SYSTEMS

State machine - state tables in embedded design - simulation - emulation of embedded systems - High-level language descriptions of S/W for embedded system - Java embedded system design

REAL TIME MODELS, LANGUAGE AND OPERATING SYSTEMS

Event based - process based - graph based models - Petrinet models - Real time languages - real time kernel - OS tasks - task states - task

scheduling - interrupt processing – clocking - communication – synchronization - Control blocks - memory requirements – control - kernel services

CASE STUDIES

Examples of complete embedded systems using MC68 HC11 - MC8051 - ADSP2181 - PIC series of microcontroller

TEXT BOOKS

1. Evesham, Developing Real Time Systems - A Practical Introduction, Galgotia Publications, New Delhi, 1996
2. Levi S., Agrawala A.K., Real Time System Design, McGraw Hill, Singapore, 1990

REFERENCES

1. Ball S.R., Embedded microprocessor systems - Real World Design, Prentice Hall, 1996
2. Herma K., Real Time Systems - Design for Distributed Embedded Applications, Kluwer Academic, 1997
3. Gajski D.D., Vahid F, Narayan S., Specification and Design of Embedded Systems, PRT Prentice Hall, New Dehi, 1994
4. Slater M., Microprocessor based design, a Comprehensive guide to effective hardware design, Prentice Hall, New Jersey, 1989

EIE321	PC BASED INSTRUMENTATION	L	T	P	C
		3	0	0	3

INTRODUCTION TO PC BASED INSTRUMENTATION

PC opened up and architecture - general structure of PC based instrumentation - advantages - disadvantages of computer based instrumentation - comparison with other control systems - introduction to various instrumentation packages like LABVIEW - genie etc

BUSES AND STANDARDS & I/O INTERFACING CARDS

BUS types- I/O BUS- ISA bus - EISA Bus - PCI bus – GPIB - RS-

232 - digital input -output card - block diagram description - opto input-output card- introduction- block diagram description

PARALLEL PORT INTERFACING

Parallel port interfacing techniques - parallel port - parallel port as output port -programming of parallel port - parallel port as input port - its programming

SERIAL PORT INTERFACING

Serial port interfacing techniques - serial port - serial port as output port - programming of serial port - serial port as input port - its programming

CASE STUDY

CNC motion controller - power plant controller - cement plant control - sugar plant control - textile plant control

TEXT BOOKS

1. Douglas V. Hall, Microprocessors and Interfacing , Tata McGraw-Hill Publishing Company Limited, New Delhi, 2nd edition, 2002
2. Mathivanan N., Microprocessors, PC hardware and interfacing, Prentice-Hall of India Private Ltd., 2003

REFERENCES

1. Kevin M. Daugherly., Analog to digital conversion, a practical conversion , Tata McGraw Hill, New Delhi, 2004
2. Ahson, S.I., Microprocessors with applications in process control, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1984
3. George Barney C., Intelligent Instrumentation, Prentice Hall of India Pvt. Ltd., New Delhi, 1998

EIE403	INSTRUMENTATION AND CONTROL IN PETROCHEMICAL INDUSTRIES	L	T	P	C
		3	0	0	3

INSTRUMENTATION AND CONTROL IN DISTILLATION COLUMNS

Distillation equipment - variables - degrees of freedom - measurement - control of column pressure - liquid distillate - vapour distillate – inserts - control of feed in reboiler – reflux - cascade - feed forward controls

INSTRUMENTATION AND CONTROL IN CHEMICAL REACTORS

Temperature - pressure control in batch reactors - instrumentation - control in dryers - batch dryers - continuous dryers

INSTRUMENTATION AND CONTROL IN HEAT EXCHANGERS

Variables - degrees of freedom - liquid to liquid heat exchangers - steam heaters – condensers - reboilers – vaporizers - use of cascade - feed forward control

INSTRUMENTATION AND CONTROL IN EVAPORATORS

Types of evaporators, measurement - control of absolute pressure – density – conductivity - differential pressure - flow

INSTRUMENTATION AND CONTROL IN EFFLUENT AND WATER TREATMENT

Chemical oxidation - chemical reduction – neutralization - precipitation - biological control

TEXT BOOK

1. Liptak, B. G., Process Control , Third edition , Chilton Book Company, Pennsylvania, 1995, ISBN–0–7506–2254-7

REFERENCES

1. Liptak, B. G., Process Measurement and Analysis, Chilton Book Company, Pennsylvania, 3rd edition, 1995, ISBN-07506-2255-5

2. Considine, D.M., Process Industrial Instruments and Control Handbook, McGraw Hill, Singapore, 4th edition, 1993, ISBN-0-07-012445-0

EIE404	INSTRUMENTATION AND CONTROL IN PAPER INDUSTRIES	L	T	P	C
		3	0	0	3

PAPER MAKING PROCESS RAW MATERIALS

Pulping - preparation - screening – bleaching – cooking - chemical addition - approach system - paper machine - drying section – calendars – drive – finishing - after treatment processes - coating. properties of paper – physical – electrical - optical - chemical properties

WET END INSTRUMENTATION

Conventional measurements at wet end - pressure – vacuum – temperature - liquid density - specific gravity – level – flow - consistency measurement - pH - ORP measurement - freeness measurement

DRY END INSTRUMENTATION

Conventional measurements – moisture - basis weight – caliper - coat thickness - optical variables - measurement of length – speed – Digester - Rotary - Batch type

CONTROL ASPECTS

Machine - cross direction control techniques - control of pressure – vacuum – temperature - liquid density - specific gravity – level – flow – pH – freeness – thickness – consistency - basis weight – moisture

PUMPS AND CONTROL VALVES

Flow box - wet end variables - evaporator feedback - feed forward control - lime mud density control - stock proportioning system - refiner control instrumentation - basic pulper instrumentation - headbox - rush/drag control - instrumentation for size preparation -

coating preparation - coating weight control - batch digester - k/kappa number control - bleach plant chlorine stage control

TEXT BOOKS

1. John R Lavigne, An Introduction to Paper Industry Instrumentation, Miller Freeman Publications, California, 1985 Series
2. Robert J. McGill, Measurement and Control in Papermaking, Adam Hilger Limited, Bristol, 1980

REFERENCES

1. John R. Lavigne, Instrumentation Applications for the Pulp and Paper Industry, Miller Freeman Publications, California, 1990
2. James P. Casey, Pulp and Paper Chemistry and Chemical Technology, John Wiley and Sons, New York, 1981
3. Sankaranarayanan, P.E., Pulp and Paper Industry Technology & Instrumentation, Kothari's Deskbook
4. Liptak, B. G., Instrument Engineers Handbook, volume 2, Process Control, Third edition, CRC press, London, 1995

EIE405	ULTRASONIC AND OPTICAL INSTRUMENTATION.	L	T	P	C
		3	0	0	3

ULTRASONIC WAVES

Principles - propagation of various waves - characterisation of ultrasonic transmission - reflection - transmission coefficients - intensity - attenuation of sound beam - power level - medium parameter - generation of ultrasonic waves - magnetostrictive - piezoelectric effects - search unit types - construction - characteristics

ULTRASONIC TEST METHODS

Pulse echo - transit time – resonance - direct contact - immersion type - ultrasonic methods of flow detection

ULTRASONIC MEASUREMENT

Ultrasonic method of measuring thickness - depth - flow - variables affecting ultrasonic testing in various applications - ultrasonic applications - ultrasonic applications in medical diagnosis – therapy - acoustical holography

THEORY AND CLASSIFICATION OF FIBRE OPTICS

Principles of light - propagation through fibre - different types of fibres - their properties - relative merits – demerits - fibre optics production – components - technology of preformed fabric ation - fibre drawing - material consideration - loss - bandwidth limiting mechanism - mechanical - thermal characteristics - fabrications of multicomponent glass fibres - light sources for fibre optics, photo detectors - source coupling - splicing - connectors

FIBRE OPTIC SENSORS

Fibre optic communication - instrument system - different types of modulators – detectors - fibre optic communication set up - Application in instrumentation - Optical fibre sensors - classification of sensor types - pressure sensors - electric - magnetic field sensors based on polarisation effects

TEXT BOOKS

1. Kasap, Opto-Electronics & photonics., Principles & practices., Allied Publishers Ltd, Chennai, 2001
2. Bray, B.E. and McBride, D., Non destructive Testing Techniques, John Wiley & Sons, New York, 1992

REFERENCES

1. Smith, H.M., Principles of Holography, Second edition, John Wiley and Sons, New York, 1975
2. Culshaw, B. and Dakin, J., Optical Fibre Sensors, Vol. 1 & 2, Artech House, Norwood, 1989
3. Krautkramer, J. and Krautkramer H., Ultrasonic Testing of Materials, Narosa Publishing House, New Delhi, 4th edition 1993

EIE406	EMBEDDED INSTRUMENTATION SYSTEM	L	T	P	C
		3	0	0	3

INTRODUCTION

Embedded system evolution trends – basic real time concepts – real time design issues – 68HCII Microcontrollers – architecture – instruction set – interrupt handling – integrating interrupts in a system – examples – shared data problem – software architecture

REAL TIME OPERATING SYSTEMS (RTOS)

Real time specifications – real time kernels – inter-task communications and synchronizations – real time memory management

SYSTEM PERFORMANCE, ANALYSIS AND OPTIMIZATION

Response – time calculation – interrupt latency – time loading - measurement – scheduling – reducing response times - analysis of memory requirements – reducing memory loading – input – output performance

DEBUGGING TECHNIQUES AND DEVELOPMENT TOOLS

Faults – failures - bugs - effects – reliability – testing – fault tolerance – host - target machines – linker / locators for embedded software – getting embedded software into target system

REAL TIME APPLICATIONS

Real time system as complex systems – real time databases – real time image processing – real time UNIX – building real time applications with real time programming languages - The tank monitoring system

TEXT BOOKS

1. Philip, A. Laplante, Real Time Systems Design and Analysis: An Engineer's Handbook, Prentice Hall of India, New Delhi, 2000

2. David E. Simon, An Embedded Software Primer, Addision Wesley, New Delhi, 2000

REFERENCE BOOKS

1. Raymond J.A. Bhur and Donald L. Bialey, An Introduction to Real Time Systems: From Design to Networking with C/C++, Prentice Hall of Inc., New Jersey, 1999
2. John B. Peatman, Design with Microcontrollers, McGraw Hill Book Co., New york, 1988
3. Jonathan W. Valvano, Embedded Micro Computer System: Real Time Interfacing, Brooks/Cole, USA, 2000
4. Krishnan, C. M. and Kang G. Shin, Real Time Systems, McGraw Hill, New Delhi, 1997

EIE407	ROBOTICS AND AUTOMATION	L	T	P	C
		3	0	0	3

BASIC CONCEPTS

Definition - origin of robotics - different types of robots - robot classification – applications - robot specifications

AUTOMATION

Components – subsystems - basic building block of automation - manipulator arms - wrists - end-effectors - transmission elements – hydraulic - pneumatic - electric drives – gears – sensors – materials - user interface - machine vision - implications for robot design - controllers

KINEMATICS, DYNAMICS AND CONTROL

Object location - three dimensional transformation matrices - inverse transformation - kinematics - path planning - Jacobian work envelope - manipulator dynamics - dynamic stabilization - position control - force control - present industrial robot control schemes

ROBOT PROGRAMMING

Robot programming languages -systems - levels of programming

robots - problems peculiar to robot programming - control of industrial robots using PLCs

AUTOMATION AND ROBOTS

Case studies - multiple robots - machine interface - robots in manufacturing - non-manufacturing applications - robot cell design - selection of a robot

TEXT BOOKS

1. Spong and Vidyasagar, Robot Dynamics and Control, John Wiley & Sons, 1990
2. Asfahl, C.R., Robots and Manufacturing Automation, John Wiley & Sons, New York, 1992

REFERENCES

1. Klafter, R.P., Chmiclewski, T.A. and Negin, M., Robotics Engineering: Integrated approach, Prentice Hall, New Jersey,1994
2. McKerrow, P.J., Introduction to Robotics, Addision Wesley, Singapore, 1991
3. Deb, S.R., Robotics Technology and Flexible Automation, Tata McGraw Hill, New Delhi, 1994

EIE408	ANALOG AND DIGITAL COMMUNICATION SYSTEM	L	T	P	C
		3	0	0	3

ANALOG COMMUNICATION SYSTEMS

Principles of Amplitude modulation - double and single side band - suppressed carrier system - AM circuits - AM Transmitters – Receivers - Angle modulation - Frequency modulation - FM receivers - FM stereo broadcasting - FM Radio communication - Television transmission - reception

DIGITAL COMMUNICATION

Sampling theorem - pulse modulation techniques – PAM - PWM -

PPM concepts - PCM encoder – decoder - Multiplexing - time division multiplexing - frequency division multiplexing - T1 Digital Carrier system

DATA COMMUNICATION TECHNIQUES

Data transmission using analog carriers - MODEMS employing FSK - PSK – DPSK – QPSK – QAM - error control techniques

DATA TRANSMISSION

Twisted pair - coaxial cables – Fiber optics – Sources - detectors – Fiber optic Complete system - Analog to digital converters - Error detection – error correction – Multiplexing – TDM - FDM

MICROWAVE LINKS

Satellite communication systems - Optical communication systems - Digital Telephony - Mobile Telephony - Voice over Packet

TEXT BOOKS

1. Tomasi, W., Electronics Communications systems, Pearson education, New Delhi 2001
2. Simon Haykins, Digital Communications, John Wiley Publishers, 1st Edition., Reprint 2004

REFERENCES

1. Kennedy, G., Electronic Communication Systems, McGraw Hill, New Delhi., IV Edition , 8th Reprint, 2003
2. Haykin S., Analog and Digital Communications, John Wiley and Sons, 1989

EIE409	BIO-MEDICAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

ANATOMY, PHYSIOLOGY AND TRANSDUCERS

Brief review of human physiology - anatomy – cell structures – electrical activities - mechanical activities - chemical activities – action potential - resting potential – different types of electrodes –

sensors used in biomedicine – selection criteria for transducers - electrodes – necessity for low noise pre-amplifiers – difference amplifiers – difference amplifiers – chopper amplifiers – electrical safety – grounding - isolation

MEASUREMENT OF BIOPOTENTIAL AND PHYSIOLOGICAL PARAMETERS

ECG – Phonocardiography – Neurophysiology – Central nervous system – EEG – Respiratory system – Muscular system - EMG, - Eye – ERG, Physiological Transducers - Measurement of Blood pressure – Blood flow - Cardiac output measurement – heart rate – respiration rate – measurement of lung volume – Oximeters – Audiometer

THERAPEUTIC AND SURGICAL EQUIPMENTS

Electro Surgical unit – short wave - microwave diathermy – Laser surgical unit – Anesthesia machine – Pacemakers – Total artificial heart (TAH) – Dialyser – Heart lung machine – Defibrillators – Ventilators – Nerve stimulators – centralized and Bedside patient monitoring system – Nerve stimulators

BIOMEDICAL EQUIPMENTS AND ELECTRICAL SAFETY

-Flame photometer – spectrophotometer – chromatography – pH, pCO2, analysis – sterilizers – Electrical safety hazards in hospitals

IMAGING SYSTEMS AND TELEMETRY

Computerized Tomography (CT) – MRI instrumentation – Ultrasound scanner – X-ray machine – Fluroscopic techniques – angiography – Cardiac catherisation lab – Echo cardiograph – vector cardiograph – Biotelemetry

TEXT BOOKS

1. Kandpur, R.S., Handbook of Biomedical Instrumentation, TMH, 2003
2. Richard Aston, Principles of Biomedical Instrumentation and Measurement, Merrill publishing company, 1990

REFERENCES
1. Arumugam, M., Biomedical Instrumentation, Anuradha Agencies, Publishers, Kumbakonam, 1992
2. Geddes, L.A. and Baker, L.E.,:Principles of Applied Biomedical Instrumentation, John wiley and Sons, 1989

EIE410	DIGITAL CONTROL SYSTEM	L	T	P	C
		3	0	0	3

SAMPLED DATA CONTROL SYSTEM

Sampling process - system representation in terms of difference equations – realizations - z transform - inverse z transform - response of linear discrete system - z- transforms analysis of sampled data control system – z domain - s domain relationship - pulse transfer functions zero order hold - steady state error analysis

STABILITY ANALYSIS

Jury's stability test - bilinear transformation - z domain nyquist stability - stability analysis using root locus diagram - correlation between time response - root locus in the z plane - s plane

STATE VARIABLE METHOD

Discrete time state equations - similarity transformations - state diagrams - Realization of pulse transfer function – direct – cascade - parallel realizations - solution of discrete state equations - Controllability - absorbability of discrete systems - Pole placement - Lyapunov stability analysis

DESIGN AND COMPENSATION

Design of sampled data control system - Cascade compensation - DIR method - lead, lag - lag- lead compensator - Digital compensator design using root locus plots - Digital compensator design using Frequency response plots. PID controllers - Deadbeat algorithm

APPLICATIONS

System models - control algorithms - their implementation for micro processor based position - temperature control systems - Operational features of stepper motors - Drive circuits - Interfacing of stepper motor to microprocessors

TEXT BOOK

1. Ogata, K., Discrete time control systems, Tata McGraw Hill New Delhi, 2nd edition, 1992

REFERENCE

1. Gopal M., Digital control and state variable methods, Tata McGraw Hill, New Delhi, 2nd edition, 2003

EIE411	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM	L	T	P	C
		3	0	0	3

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Overview of AI-general concepts-problem spaces – search techniques – BFS - DFS – Heuristic search techniques

KNOWLEDGE REPRESENTATION

Knowledge-general concepts – predicate logic-representing simple fact – instance - ISA relationships – resolution-natural deduction

KNOWLEDGE ORGANIZATION AND MANIPULATION

Procedural Vs declaration knowledge-forward Vs backward reasoning – matching techniques – control knowledge/strategies - symbol reasoning under uncertainty –non – monotonic reasoning-logic for monotonic reasoning

PERCEPTRON – COMMUNICATION AND EXPERT SYSTEMS

Natural language processing – pattern recognition – visual image understanding – expert system architecture

KNOWLEDGE ACQUISITION

Knowledge acquisition-general concepts – learning – learning by induction – explanation based learning

TEXT BOOKS

1. Nilson, N.J., Principles of Artificial Intelligence, Springer Verlag, Berlin, 1980
2. Patterson, Introduction to Artificial Intelligence and Expert systems, Prentice Hall, of India, New Delhi, 1990

REFERENCES

1. Elaine Rich and Kelvin Knight, Artificial Intelligence, Tata McGraw Hill, New Delhi, 1991
2. Stuart Russell and Peter Norvig, Artificial Intelligence: A modern approach. Prentice Hall of India, 1995

EIE412	OPTIMAL AND ADAPTIVE CONTROL	L	T	P	C
		3	0	0	3

PROBLEM FORMULATION

Mathematical model – physical constraints- performance measure - optimal control problem - performance measures for optimal control problem - selection a performance measure

DYNAMIC PROGRAMMING

Optimal control law – principle of optimality-an optimal control system - a recurrence relation of dynamic programming – computational procedure characteristics of dynamic programming solution hamilton – jacobi – bellman equation continuous linear regulator problems

CALCULUS OF VARIATIONS

Fundamental concepts – functionals - piecewise – smooth externals constrained extrema

VARIATIONAL APPROACH TO OPTIMAL CONTROL PROBLEMS

Necessary conditions for optimal control – linear regulator problems- linear tracking problems - pontryagin's minimum principle and state inequality constraints

ADAPTIVE CONTROL

Classification – MRAC systems – different configuration, classification, mathematical description – direct and indirect MRAC – self tuning regulator – different approach to self tuning, recursive parameter estimation, implicit and explicit STR

TEXT BOOKS

1. Donald E. Kirk, Optimal Control Theory: An Introduction, Prentice-Hall networks series, 1970
2. Chalam, V.V., Adaptive control systems Marcel Dekker, INC New York and Bassel, 1987
3. Anderson B.D.O., and Moore, J. B., Optimal control Linear Quadratic methods, Prentice Hall of India, New Delhi, 1991

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1. Sage, A.P, and White.C. C, Optimum Systems Control, Second Edition, Prentice Hall, 1977
2. Astrom, K.J. and Wittenamrk, B., Adaptive control, Addison Wesley Publishing Co. USA, 1989
3. Sastry S. and Bodson M. Adaptive control Stability, Convergence and Robustness, Prentice Hall, New Jersey, 1989

EIE413	INSTRUMENTATION ANALYSIS FOR ENVIRONMENTAL SCIENCES	L	T	P	C
		3	0	0	3

NEED FOR ENVIRONMENTAL MONITORING

Standards for pollution levels (concentration) in respect of air quality -water quality - noise levels - impact of pollution on human health – vegetation - animal - property value - Biological quality of water -

bacteria - virus. Applications of sophisticated microscopes - Electron microscope for identification of microbial organisms

WATER QUALITY PARAMETERS

pH – conductivity - temperature – turbidity - Chemical pollutants – chlorides – sulphides - nitrates – nitrites – phosphates – fluorides - phenolic compounds - measurement techniques for their parameters

ELEMENTAL CONCENTRATION IN WATER

Mercury - lead, chromium – arsenic – zinc – cadmium – copper – selenium - nickel sodium – potassium - lithium - measurement techniques for their parameters - air pollutants – gases – vapours - particulate matter - their impact air quality standards

MEASUREMENT TECHNIQUES FOR PARTICULATE MATTER

Measurement techniques for particulate matter in air - oxides of sulphur - oxides of nitrogen - unburnt hydro-carbons - carbon dioxide - carbon monoxide - ozone

NOISE POLLUTION

Desirable levels of sound - measurement of sound level - Soil pollution - Insecticides - pesticides – fertilizers - Measurement techniques for these pollutants - Solid waste disposal techniques – incinerators - impact of solid waste dumps

TEXT BOOKS

1. Arthur C. Stern (Ed)., Air Pollution, Third edition, Academic Press, New York, 1997
2. Andrew J.F., et al., Instrumentation, Control and Automation for waste-water treatment systems. Progress is water technology Vol-6, Pergamon Press, Oxford, 1988

REFERENCES

1. Liptak B.G (Ed)., Environmental Engineers Handbook Vol - I, II & III, Second edition, Chilton Book Company, Pennsylvania, 1997
2. Down, R.D., Environmental Control systems , ISA Press, New York , 1995
3. Moore, R.L., Environmental Protection by the neutralisation of waste water using pH control, 2nd edition, ISA Press,New York , 1995

EIE414	INSTRUMENTATION SYSTEM DESIGN AND ANALYSIS	L	T	P	C
		3	0	0	3

DESIGN OF TRANSDUCERS WITH ASSOCIATED CIRCUITRY

Interfacing primary elements with end devices - design of the bridge circuits - amplifiers for strain gauge – RTD - design of reference junction compensation - linearising circuits for thermocouple – thermistors - design of charge amplifiers - design of square root extractors for variable head flow meters

DESIGN OF TWO AND FOUR WIRE TRANSMITTERS WITH 4 – 20 mA OUTPUT

Smart transmitters – design of pneumatic - electronic controllers - design of instrumentation servo mechanism - design of annunciators - low level - high level annunciators

DESIGN OF CONTROL VALVES

Choice of valve body, materials – flow - lift characteristics - control valve sizing - piping - instrumentation diagrams - ISA symbols - process - instrumentation (PI) diagram of typical process plants

DESIGN OF MICROPROCESSOR AND MICRO CONTROLLER BASED INSTRUMENTATION SYSTEM

Design of interfacing circuits - orifice sizing for flow measurements - preparation of instrumentation project - process flow sheets -

instrument index sheet - instrument specification sheet for pressure - choice of temperature – flow – level - analytical instruments - control panels

ANALYSIS OF EXPERIMENTAL DATA

Significant figure – sources - classification of errors – estimation of the measured values – mean - standard deviation – parabolic values – calculation of limiting errors – normal distribution – chi – square test – method of least squares- design of experiments

TEXT BOOKS

1. Sheingold, D.H., Transducer Interfacing Handbook – The guide to analog signal conditioning. Analog devices Inc., Massachusetts, 1980
2. Anderson, N.A., Instrumentation for process measurements; Chilton book company, Pennsylvania, 1980

REFERENCES

1. Barney G.C., Intelligtent Instrumentation- Microprocesor application in measurement and control, PHI, 1982
2. Andrew W., Applied Instrumentation in process Industry; Vol II. Gulf publications, 1990
3. Johnson C.D., Process control Instrumentation technology, PHI, 4th edition, 1995
4. Doebelin, E.O., Measurement Systems Apllication & Design, McGraw Hill Book Co., New Delhi, 5th Edition 2004

EIE415	MICROCONTROLLER BASED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

ROLE OF MICRO-CONTROLLERS

Types and selection – Application example

MICRO-CONTROLLER RESOURCES

Family members - bus width program - data memory parallel ports

- D/A - A/D converters - reset circuitry - watchdog timers - power – down considerations

REAL-TIME CONTROL
Interrupt structures programmable timers - real-time clock – latency – interrupt - density - interval constraints

PROGRAMMING FRAMEWORK
CPU register – Structure - addressing modes - instruction sets - assembly languages - assemblers

SOFTWARE BUILDING BLOCKS
Queues, tables and strings - program organization - micro controller expansion methods - I/O hardware alternatives - development tools - motorola - Intel micro controller details

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

REFERENCES
1. Yeralan, S. and Ahluwalia.A., Programming and Interfacing the 8051 Micro controller, Addison Wesley, 1995
2. Intel Manual on 16 bit – embedded controllers, 1991
3. Mathivanan. N., Microprocessors, PC hardware and interfacing, Prentice-Hall of India Private Ltd.,2003

EIE416	OPTIMIZATION TECHNIQUES	L	T	P	C
		3	0	0	3

INTRODUCTION TO OPTIMIZATION
Engineering applications - classical optimization techniques - linear programming – simplex method – duality - karmankar's method

MULTIVARIABLE OPTIMIZATION

With equalities - without equalities - weighted sum method - E constraint method - goal programming

NON LINEAR PROGRAMMING

One dimensional minimization - geometric programming - dynamic programming - queuing theory - game theory

EVOLUTIONARY COMPUTATION TECHNIQUES

Genetic algorithm – EP – PSO – ANT – NSGA-II

APPLICATION

Conventional - Evolutionary optimization methods for control problems

TEXT BOOKS

1. Kalyanmoy deb, Multi objective evolutionary Algorithms, John wiley & sons, 1st edition, 2002
2. Rao, S.S., Optimization: theory and applications, New age international publishers, 4th edition, 2002

REFERENCE

1. Kanti Swarup, et al, Operation Research, Sultan Chand, 11th Edition, 2003

MINOR ELECTIVES

CSE357	SOFTWARE ENGINEERING AND SYSTEM	L	T	P	C
		3	0	0	3

CONCEPTS
Systems engineering - Software project planning - Cost estimation - Project scheduling

ANALYSIS-Data flow oriented design - Object oriented life cycle models - CASE tools

SOFTWARE DESIGN
Software design fundamentals - Data structure oriented Design - JS, LCP - Various design methods

IMPLEMENTATION AND TESTING
Testing objectives - Black box testing - white box testing - Various testing strategies - Art of debugging

MAINTENANCE
Re-engineering - Reverse engineering - Reliability - Repair - availability - models - Recent trends - developments

TEXT BOOKS
1. Pressman, R.S., Software Engineering - A practitioners approach, 3rd Edition, McGraw Hill International editions, 1992
2. Stephen R. Schach, Object oriented and classical software Engineering, 4th Edition, McGraw Hill, 2002

CSE457	NETWORKS AND PROTOCOLS FOR INSTRUMENTATION	L	T	P	C
		3	0	0	3

INTRODUCTION AND BASIC PRINCIPLES

Protocols - physical standards - modern instrumentation - bits,bytes – characters - communication principles - communication modes - synchronous - asynchronous systems - transmission characteristics data coding - UART

SERIAL COMMUNICATION STANDARDS

Standards organizations - serial data communications interface standards - balanced - unbalanced transmission lines - RS232 – 422 – 423 – 449 - 485 interface standard – troubleshooting - 20mA current loop - serial interface converters - interface to printers - IEEE 488 – USB

INTRODUCTION TO PROTOCOLS

Flow control protocols - BSC Protocols – HDLC – SDLC - data communication for instrumentation - control, individual OSI layers - OSI Analogy-example

INDUSTRIAL PROTOCOLS

ASCII based protocols - modbus protocols - allen bradley protocol - HART, field bus

LOCAL AREA NETWORKS

Circuit - packet switching - network topologies - LAN standards – Ethernet - MAC - token bus - internet work connections – NOS - network architecture - protocols

TEXT BOOKS

1. John Park, et al., Wright Practical Data Communications for Instrumentation and Control, Elseiver Publications, 1st edition, ISBN 0750657979

REFERENCES

1. Stallings, W., High speed Networks TCP/IP and ATM Design Principles, PHI , 1998
2. Behrouz A. Forouzan., Data Communication and Networking, 2nd Edition TMH, 2000

CSE467	DATA BASE MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION AND CONCEPTUAL MODELING

File - database systems- database system structure – data models – network and hierarchical models – ER model – relational model – relational algebra and calculus

RELATIONAL MODEL

SQL – data definition- queries in SQL- updates- views – integrity and security – relational database design – functional dependences - normalization for relational databases

DATA STORAGE AND QUERY PROCESSING

Record storage and Primary file Organization- secondary storage devices- operations on files- heap file- sorted files- hashing techniques – index structure for files –different types of indexes- B-Tree - B+Tree – query processing

RANSACTION MANAGEMENT

Transaction processing – need for concurrency control- desirable properties of transaction - schedule and recoverability y-serializability - schedules – concurrency control – types of locks - two phases locking – deadlock - time stamp based concurrency control – recovery techniques – concepts- immediate update-deferred update - shadow paging

CURRENT TRENDS

Object oriented databases – need for complex data types- OO data model- nested relations- complex types- inheritance reference types - distributed databases- homogenous and heterogenous- distributed

data storage – XML – structure of XML- data- XML document- schema- querying and transformation. – data mining - data warehousing

TEXT BOOKS

1. Abraham Silberschatz, et al., Database System Concepts, McGraw-Hill, 4th edition, 2002
2. Ramez Elmasri and Shamkant B., Fundamental Database Systems, Pearson Education, 3rd edition, 2003

REFERENCES

1. Raghu Ramakrishnan, Database Management System, Tata McGraw-Hill Publishing Company, 2003
2. Peter Rob and Corlos Coronel, Database System, Design, Implementation and Management, Thompson Learning Course Technology, 5th edition, 2003

MEC308	MECHATRONICS	L	T	P	C
		3	0	0	3

INTRODUCTION TO MECHATRONICS

Systems - measurement systems - control systems - mechatronics approach

SENSORS

Performance terminology – displacemen - position – proximity - velocity – motion - fluid pressure - temperature sensors - light sensors - selection of sensors - signal processing

ARCHITECTURE

Pin configuration-instruction set - programming of microprocessors using 8085 instructions - interfacing input - output devices - interfacing D/A converters - A/D converters – applications - temperature control - stepper motor control - traffic light controller

PROCESSING

Basic structure - input/output processing – programming – mnemonics - timers, internal relays - counters-data handling-analog input/output-selection of a PLC

STAGES IN DESIGNING MECHATRONIC SYSTEMS

Traditional - mechatronic design - possible design solutions - case studies of mechatronic systems - pick - place robot - automatic car park system -engine management system

TEXT BOOK

1. Michael, B., et al., Introduction to Mechatronics and Measurement Systems, McGraw Hill International Editions, 1999

REFERENCE

1. Ram, K., Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications, 4th Revised Edition, 1999

MEC457	MEMS AND NANO TECHNOLOGY	L	T	P	C
		3	0	0	3

INTRODUCTION

Historical background - development of microelectronics - evolution of micro sensors – mems - emergence of micro machines - electronic materials – processing – introduction - electronic materials - their deposition - pattern transfer - etching electronic materials - doping semiconductors

MEMS MATERIALS AND PROCESSING

Overview, metals – semiconductors – ceramic - polymeric - composite materials - Silicon micro machining – bulk- etch-stop techniques - dry etching - buried oxide process - silicon fusion bonding - anodic bonding

SILICON MICRO MACHINING

Surface - sacrificial layer technology - material systems in sacrificial layer technology - plasma etching - combined IC technology - anisotropic wet etching

MICRO SENSORS

Thermal sensors - radiation sensors - mechanical sensors - magnetic sensors - biochemical sensors - flow sensors - SAW devices - saw devices development - history, transducers in SAW devices - acoustic waves

NANOTECHNOLOGY

Scientific revolutions - types of nanotechnology – nanomachines - nano materials – atomic structure surfaces - dimensional space - molecular nanotechnology - nanopowders – nanomaterials - preparation and applications

TEXT BOOKS

1. Simon Sze, Semiconductor Sensors, John Wiley & Sons, Inc., New Delhi., 1994
2. Elwenspoek, M. and Wiegerink.R., Mechanical Microsensors, Springer-Verlag Berlin Heidelberg, 2001

REFERENCES

1. Poole, P. and Frank J. Owens., Introduction to Nano Technology., John Wiley & Sons., INC., 2003
2. Bharat Bhushan, Hand Book of Nano technology, Springer Publication., 1st edition, 2004
3. Julian W. Gardner and Vijay K. Varadan, Microsensors, Mems, And Smart Devices, John Wiley & sons ltd., New Delhi, 2001
4. Massood Tabib-azar, microactuators - electrical, magnetic, thermal, optical, mechanical, chemical and smart structures, kluwer academic publishers, New York, 1997

INT355	INTERNET AND WEB TECHNOLOGY	L	T	P	C
		3	0	0	3

BASICS OF NETWORKS

Introduction to Internet and Web – Basics of computer networks – Topologies – signaling methods – Internet and its basics – Web servers – Browsers – Issues for the design of networking – Security issues

WEBSITE AND WEBCASTING TECHNIQUES

Introduction – Creation of a website – Hyper text and HTML – Document structuring tags – Dynamic HTML – XML – Search Engines – Tools – Channels Push Technology

JAVA PROGRAMMING

Language basics – Java classes – constructors – Java objects and their creations – Interfacing methods – Classes – Data encapsulation techniques – Java IO

JAVA COMPONENTS / NETWORK PROGRAMMING

Computer Interface – Creation of GUI – Applets – Java Beans – CORBA – EJBs – Network Programming – Socket creation – URL classes – Socket classes – Programming for security

DYNAMIC FUNCTIONALITY IN WEB PAGES

CGI – Four steps for CGI – Script specification – CGI Script languages – Dynamic page functionalities using servelets – JSPs – ASPs – COMs – DCOMs

TEXT BOOK

1. RajKamal, Internet and Web Technologies, TMH, 2005

REFERENCE

1. Markur Pope, Mastering Internet Programming , Galgotia Publications, 1996

HUMANTIES ELECTIVES

HSS001	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION TO QUALITY MANAGEMENT

Definitions – TOM framework, benefits, awareness and obstacles - Quality – vision, mission and policy statements - Customer Focus – customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product and service quality. Cost of quality

PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology

STATISTICAL PROCESS CONTROL AND PROCESS CAPABILITY

Meaning and significance of statistical process control (SPC) – construction of control charts for variables and attributed - Process capability – meaning, significance and measurement – Six sigma concepts of process capability - Reliability concepts – definitions, reliability in series and parallel, product life characteristics curve - Business process re-engineering (BPR) – principles, applications, reengineering process, benefits and limitations

TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT

Quality functions development (QFD) – Benefits, Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements

of reliability, failure rate, FMEA stages, design, process and documentation

TAGUCHI TECHNIQUES

Taguchi techniques – introduction, loss function, parameter and tolerance design, signal to noise ratio - Seven old (statistical) tools - Seven new management tools - Bench marking and POKA YOKE

REFERENCES

1. Dale H. Besterfield, et al., Total Quality Management, Perarson Education, Thrid edition, (First Indian Reprints 2004)
2. Shridhara Bhat K., Total Quality Management – Text and Cases, Himalaya Publishing House, First Edition, 2002
3. William J. Kolarii, Creating quality, Mcgraw Hill, 1995
4. Poornima M.Charantimath, Total quality management, Pearson Education, First Indian Reprint, 2003

HSS002	ENGINEERING MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Demand and Revenue Analysis - Demand Forecasting - Production Analysis - Cost and Supply Analysis, Price and output Determination - Investment Analysis - Plant Location - Economic Optimization

FORMS OF BUSINESS AND FUNCTIONS

Types of Business Organisation, Forms - Planning - Organizing - Designing effective organisations - Coordination

HUMAN RESOURCE DEVELOPMENT

Motivating individuals and workgroups - Leadership for Managerial Effectiveness - Team working and Creativity - Managerial Communication - Personal Management – Time Management - Stores Management - Career Planning

FINANCIAL MANAGEMENT

Product development - Management techniques in product development - Nature of controlling - Operations Management - Just-in-Time

GLOBAL ENVIRONMENT

Managing World Economic Change - The global environment - Multinational Strategies - Economic Cycles and Director Investment - Change and Organisation Development - Managerial Ethics and Social responsibilities

REFERENCES

1. Harold Koontz and Heinz Weihrich, Essentials of Management, Tata McGraw Hill publishing company Ltd.
2. Koontz, Weihrich and Aryasari, Principles of Management, Tata McGraw Hill publishing company Ltd.
3. Tripathi, Reddy, Principles of Management, Tata McGraw Hill publishing company Ltd.
4. Hampton, Management, Tata McGraw Hill publishing company Ltd.

HSS004	INDUSTRIAL PSYCHOLOGY	L	T	P	C
		3	0	0	3

INTRODUCTION

The role of the psychologist in industry, the field of occupational Psychology - Study of behaviour in work situation and applications of Psychological principles to problems of selection, Placement, Counseling and training

DESIGN OF WORK ENVIRONMENTS

Human engineering and physical environment techniques of job analysis, Social environment- Group dynamics in Industry Personal psychology - Selection, training, placement, promotion, counseling, job motivations, job satisfaction .Special Study of problem of fatigue, boredom and accidents

UNDERSTANDING CONSUMER BEHAVIOUR

Consumer behaviour; study of consumer preference, effects of advertising, Industrial morale - the nature and scope of engineering psychology, its application to industry

WORK METHODS

Efficiency at work, the concept of efficiency, the work curve, its characteristics - The work methods; hours of work, nature of work, fatigue and boredom, rest pauses. The personal factors; age abilities, interest, job satisfaction The working environment - noise, illumination, atmospheric conditions - Increasing efficiency at work; improving the work methods, Time and motion study, its contribution and failure resistance to time and motion studies, need for allowances in time and motion study

WORK AND EQUIPMENT DESIGN

Criteria in evaluation of job-related factor, job design, human factors, Engineering information, input processes, mediation processes, action processes, methods design, work space and its arrangement, human factors in job design. Accident and Safety - The human and economic costs of accidents, accident record and statistics, the causes of accidents situational and individual factors related to accident reduction

REFERENCES

1. Tiffin, J. and McCormic, E.J., Industrial Psychology, Prentice Hall, 6th Edition, 1975
2. McCormic E.J., Human Factors engineering and design, McGraw Hill, 4th Edition,1976
3. Mair, N.R.F., Principles of Human relations
4. Gilmer, Industrial Psychology
5. Ghiselli & Brown, Personnel and Industrial Psychology.
6. Myer, Industrial Psychology
7. Dunnete, M.D., Handbook of Industrial and Organizational Psychology
8. Blum & Taylor, Industrial Psychology

HSS006	PROFESSIONAL ETHICS	L	T	P	C
		3	0	0	3

ENGINEERING ETHICS

Functions of Being a Manager – Stock holder and stakeholder management - Ethical treatment of employees - ethical treatment of customers- supply chain management and other issues

ENGINEERING AS SOCIAL EXPERIMENTATION

Senses of Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas - Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional ideals and virtues – Theories about right action – Self-interest – Customs and religion – Use of Ethical Theories

ENGINEER RESPONSIBILTY FOR SAFETY

Corporate social responsibility - Collegiality and loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Discrimination

RESPONSIBILITY AND RIGHTS

Moral imagination, stake holder theory and systems thinking - One approach to management Decision – making Leadership

GLOBAL ISSUES

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample code of conduct

REFERENCES

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York, 1996
2. Charles D. Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 1999
3. Laura Schlesinger, How Could You Do That: The Abdication of Character, Courage, and Conscience, Harper Collins, New York, 1996
4. Stephen Carter, Integrity, Basic Books, New York, 1996
5. Tom Rusk, The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life, Viking, New York, 1993

HSS014	MARKETING MANAGEMENT	L	T	P	C
		3	0	0	3

MARKETING

Meaning - concept - functions - marketing Planning & implementation marketing Programmes - Marketing environment – Market Segmentation and consumer behaviour – Influencing factors, Decision process – Marketing mix – Marketing department

PRODUCT

Meaning - Product planning - policies - positioning - New product development Product life cycle – BCG Matrix-branding. Packing, labeling

PRICING

Pricing objectives – Setting and modifying the price – Different pricing method Product line pricing and new product pricing

DISTRIBUTION

Nature of Marketing channels - Types of Channel flows - Channel functions - Channel co-operation, conflict and competition - Direct Marketing Telemarketing, Internet shopping

PROMOTION

Promotion Mix - Advertisement - Message - copy writing - Advertisementbudgeting - Measuring advertisement effectiveness - Media strategy - sales promotion - Personal selling, publicity and direct marketing

REFERENCES

1. Philip Kotler, Marketing Management- Analysis Planning and Control, Prentice Hall of India, New Delhi
2. Cundiff, Still and Govoni, Fundamentals of Modern Marketing, Prentice Hall of India, New Delhi
3. Ramaswamy V.S. and Namakumari S., Marketing Management- Planning Implementation and Control, Macmillan Business Books, 2002
4. Jobber, Principles and Practice of Marketing, McGraw-Hill

HSS015	MANAGEMENT CONCEPTS AND TECHNIQUES	L	T	P	C
		3	0	0	3

DEVELOPMENT OF MANAGEMENT THOUGHT

Scientific Management Movement, Administrative Movement, Human-Relations Movement, Decision-Science Movement, Behavioral Movement, Systems Movement, Contingency Movement

ESSENTIALS OF PLANNING

Objectives, goals, Programmed Decisions and Un programmed Decisions; Decision-Making, Creativity in Decision-Making, Forecasting and Strategy to Formulation

EFFECTIVE ORGANIZING

Span of Control, Departmentation, Authority; Responsibility, Bureaucracy and Adhocracy; Group Dynamics

REALITIES OF ORGANIZATIONAL LIFE

Organizational Politics, Organizational Power, Organizational Conflict

COMMUNICATION & CONTROL

Communication Process Evaluation, Control Process, Qualities of a Good Control System, Management Audit, Human – Offset Accounting, Cost Benefit Analysis

REFERENCES

1. Harold Koontz and Heinz Weihrich, Essentials of Management, Tata McGraw Hill publishing company Ltd
2. Koontz, Weihrich and Aryasari, Principles of Management, Tata McGraw Hill publishing company Ltd
3. Tripathi and Reddy, Principles of Management, Tata McGraw Hill publishing company Ltd
4. Hampton, Management, Tata McGraw Hill publishing company Ltd
5. Prasad, L.M., Principles of Management

HSS016	ORGANIZATIONAL PSYCHOLOGY	L	T	P	C
		3	0	0	3

FOCUS AND PURPOSE

Definition, need and importance of organizational Behaviour – nature and scope – frame work

INDIVIDUAL BEHAVIOUR

Personality – types – factors influencing personality – theories – learning – types of learners – learning theories – organizational Behaviour modification. Attitudes – characteristics – components – formation – measurement. Perceptions – importance – factors influencing perception – interpersonal perception

GROUP BEHAVIOUR

Organization structure – formation – groups in organizations – influence – group dynamics – emergence of informal leaders and working norms – group decision making techniques – interpersonal relations – communication – control

POWER

Leadership styles – theories – leaders Vs managers – sources of power – power centers – power and politics

DYNAMICS OF ORGANIZATIONAL BEHAVIOURS

Organizational climate – factors affecting organizational climate – importance. Job satisfaction – determinants – measurements – influence on behavior. Organizational change – importance – stability Vs change – proactive Vs reaction change – the change process – resistance to change – managing change. Organizational development – characteristics – objectives – team building. Organizational effectiveness – perspective – effectiveness Vs efficiency – approaches – the time dimension – achieving organizational effectiveness

REFERENCES

1. Stephen P. Robins, Organisational Behavior, Prentice Hall of India, 9th edition, 2001
2. Hellriegel, Slocum and Woodman, Organisational Behavior, South-Western, Thomson Learning, 9th edition, 2001
3. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 7th edition, 2001
4. Jit S. Chand, Organisational Behavior, Vikas publishing House Pvt. Ltd., 2nd edition, 2001
5. Fred Luthans, Organisational Behavior, McGraw Hill Book Co., 1998
6. New Strom and Davis, Organisational behaviour, McGraw Hill, 2001
7. Jaffa Harris and Sandra Hartman, Organisational Behaviour, Jaico, 2002

HSS017	INTERNATIONAL ECONOMICS	L	T	P	C
		3	0	0	3

INTRODUCTION

The Traditional Theory of International Trade, The Basic Trade Model, Heckscher-Ohlin-Samuelson Model, Effects of Tariffs & Quotas, Theory of Factor Movements - New Theories of International Trade and Industrial Policies

EXCHANGE RATE AND BALANCE OF PAYMENT

The Balance of Payments and National Accounts, Determinants of Exchange Rates The Exchange-Rate Regime Choice and a Common Currency Area, International Debt and Currency Crises

INTERNATIONAL REGULATORY AUTHORITY

Political Economy of Trade Disputes, the FTA and the WTO - The role of the IMF and other International Financial Organizations
Reasons for Protection World Trade, International Movements of Capital - The Balance of Trade and Other Measures of International Transactions-Export and import policies

INTERNATIONAL MACROECONOMICS

European Monetary Unification and the Euro - Preferential Trading Arrangements and the NAFTA International Policies for Economic Development, Trade Outsourcing and Off shoring

REFERENCES

1. Bhagwati, N., Panagariya, A. and Srinivasan, T. N., Lectures on International Trade, MIT Press, 2nd edition, 1998
2. Obstfeld M. and Rogoff, K., Foundation of International Macroeconomics, McGraw-Hill, 1996
3. Romer, D., Advanced Macroeconomics, McGraw Hill, 1996

HSS018	COMMUNICATION SKILLS	L	T	P	C
		3	0	0	3

COMMUNICATION IN BUSINESS

Systems approach, forms of business communication, management and communication, factors facilitating communication

COMMUNICATION PROCESS

Interpersonal perception, selective attention, feedback, variables, listening barriers to listening, persuasion, attending and conducting interviews, participating in discussions, debates and conferences, presentation skills, paralinguistic features, oral fluency development

BUSINESS CORRESPONDENCE

Business letter. Memos, minutes, agendas, enquiries, orders, sales letters, notice, tenders, letters of application, letter of complaints

TECHNICAL REPORTS

Format, Choice of vocabulary, coherence and cohesion, paragraph writing, organization

PROJECT REPORTS

Project proposal, project reports, and appraisal reports

REFERENCES

1. Sharan J. Genrson and Steven M.Gerson, Technical Writing - Process and Product, Pearson Education, 2000
2. Raymond V. Lesikar, et al., Basic Communication, Tata McGraw Will, 8th Edition, 1999
3. Stevel. E. Pauley, Daniel G. Riordan, Technical Report Writing Today, AITBS Publishing & Distributors, India 5th edition, 2000
4. Robert L. Shurter, Effective letters in business, Third Ed., 1983.
5. McGraith, Basic Managerial Skills for all Prentice Hall of India, 6th Edition, 2002
6. Halliday, Ky M.A. and R.Hasan, Cohesion in English, Longman, London, 1976

HSS020	HUMAN RESOURCE MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Functions of a human resources manager - recruitment and selection processes interview methods

HR- EVALUATION AND DEVELOPMENT

Performance appraisal, Training and development, disciplinary procedures, collective bargaining and employee welfare

TRENDS IN HRM

The recent methods and trends in HRM with a few case studies in the context of globalization

STRATEGIC ROLE OF HUMAN RESOURCE MANAGEMENT

Job analysis Personnel planning and recruiting Employee testing and selection, interviewing candidates, Appraising performance

CAREER AND COMPENSATION

Managing careers Compensation Benefits and services Labor relations and collective bargaining Employee safety and health

REFERENCES

1. Decenzo and Robbins, Human Resource Management, Wiley, 6th edition, 2001
2. Biswajeet Pattanayak, Human Resource Management, Prentice Hall of India, 2001
3. Eugene McKenna and Nic Beach, Human Resource Management, Pearson Education.
4. Dessler, Human Resource Management, Pearson Education Limited, 2002
5. Mamoria C.B. and Mamoria S., Personnel Management, Himalaya Publishing.

6. Wayne Cascio, Managing Human Resources, McGraw-Hill, 1998
7. Ivancevich, Human Resource Management, McGraw-Hill, 2002

HSS023	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

ENTREPRENEURIAL COMPETENCE

Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneur – Personality Characteristics of Successful. Entrepreneur – Knowledge and Skills Required for an Entrepreneur

ENTREPRENEURIAL ENVIRONMENT

Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services - Central and State Government Industrial Policies and Regulations - International Business

BUSINESS PLAN PREPARATION

Sources of Product for Business – Pre-feasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria

LAUNCHING OF SMALL BUSINESS

Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching

MANAGEMENT OF SMALL BUSINESS

Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units - Effective Management of small Business

REFERENCES

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001

2. Saravanavel, P., Entrepreneurial Development, Ess Pee kay Publishing House, Chennai,1997
3. Khanka, S.S., Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001
4. Prasama Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill Publishing Company Limited, 1996
5. Jain, P.C., (ed.), Handbook for New Entrepreneurs, EDII, Oxford University Press, New Delhi, 1999
6. Staff College for Technical Education, Manila and Centre for Research and Industrial Staff Performance, Bhopal, Entrepreneurship Development, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1998