ANNA UNIVERSITY TIRUCHIRAPPALLI
TIRUCHIRAPPALLI – 620 024

Regulations 2008

Curriculum

B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

SEMESTER III

S. No.	Subject Code	Subject	L	T	P	C
		Theory				
1	**MA1201**	Transforms and Partial Differential Equations	3	1	0	4
2	**HS1201**	Environmental Science and Engineering	3	0	0	3
3	**EE1202**	Electrical Machines	3	0	0	3
4	**EC1209**	Electron Devices and Circuits	3	0	0	3
5	**CS1201**	Data Structures	3	0	0	3
6	**EI1201**	Electrical Measurements	3	1	0	4
		Practical				
7	**EC1210**	Electron Devices and Circuits Laboratory	0	0	3	2
8	**CS1203**	Data Structures Laboratory	0	0	3	2
9	**EE1203**	Electrical Machines Laboratory	0	0	3	2
					Total	**26**

SEMESTER IV

S. No.	Subject Code	Subject	L	T	P	C
		Theory				
1	**EE1253**	Control Systems	3	1	0	4
2	**EI1251**	Industrial Instrumentation I	3	0	0	3
3	**EI1252**	Transducer Engineering	3	0	0	3
4	**EC1261**	Digital logic Circuits	3	1	0	4
5	**EC1260**	Linear Integrated Circuits and Applications	3	0	0	3
6	**ME1260**	Applied Thermodynamics	3	1	0	4
		Practical				
7	**EI1253**	Transducers and Measurements Laboratory	0	0	3	2
8	**ME1261**	Thermodynamics Laboratory	0	0	3	2
9	**EC1262**	Linear and Digital Integrated Circuits Laboratory	0	0	3	2
					Total	**27**

SEMESTER V

S. No.	Subject Code	Subject	L	T	P	C
Theory						
1	**MG1301**	Total Quality Management	3	0	0	3
2	**EC1307**	Digital Signal Processing	3	1	0	4
3	**EC1308**	Principles of Communication Engineering	3	0	0	3
4	**CS1312**	Object Oriented Programming	3	0	0	3
5	**EI1301**	Electronic Instrumentation	3	1	0	4
6	**EI1302**	Industrial Instrumentation II	3	0	0	3
Practical						
7	**EC1309**	Digital Signal Processing Laboratory	0	0	3	2
8	**CS1313**	Object Oriented Programming Laboratory	0	0	3	2
9	**EI1303**	Industrial Instrumentation Laboratory	0	0	3	2
					Total	**26**

SEMESTER VI

S. No.	Subject Code	Subject	L	T	P	C
Theory						
1	**EC1301**	Microprocessor and Microcontroller	3	0	0	3
2	**EI1351**	Analytical Instruments	3	0	0	3
3	**EI1352**	Process Control	3	1	0	4
4	**EE1353**	**Power Electronics**	**3**	**1**	**0**	**4**
5	**EI1354**	Fiber Optics and Laser Instruments	3	0	0	3
6	**EE1354**	**Modern Control Systems**	**3**	**1**	**0**	**4**
Practical						
7	**EC1304**	Microprocessor and Micro controller Laboratory	0	0	3	2
8	**EI1356**	Process Control Laboratory	0	0	3	2
9	**HS1301**	Communication and Soft Skills Laboratory	0	0	3	2
					Total	**27**

SEMESTER VII

S. No.	Subject Code	Subject	L	T	P	C
Theory						
1	**EI1401**	Computer Control of Process	3	1	0	4
2	**IC1401**	Virtual Instrumentation	3	0	0	3
3	**EC1357**	VLSI Design	3	1	0	4
4	**MG1402**	Operations Research	3	1	0	4
5	**E1******	Elective I	3	0	0	3
6	**E2******	Elective II	3	0	0	3
Practical						
7	**EC1359**	VLSI Design Laboratory	0	0	3	2
8	**EI1402**	Computer Control of Process and Virtual Instrumentation Laboratory	0	0	3	2
					Total	**25**

SEMESTER VIII

S. No.	Subject Code	Subject	L	T	P	C
Theory						
1	**CS1452**	Neural Network and Fuzzy Logic Control	3	0	0	3
2	**EI1451**	Distributed Control System	3	0	0	3
3	**E3******	Elective III	3	0	0	3
4	**E4******	Elective IV	3	0	0	3
Practical						
5	**EI1455**	Project	0	0	12	6
					Total	**18**

LIST OF ELECTIVES

S. No.	Subject Code	Subject	L	T	P	C
Elective I						
1	**CS1029**	Artificial Intelligence and Expert Systems	3	0	0	3
2	**ME1016**	Mechatronics	3	0	0	3
3	**CS1358**	Computer Architecture	3	0	0	3
4	**GE1301**	Professional Ethics and Human Values	3	0	0	3
5	**EI1001**	Power Plant Instrumentation	3	0	0	3
Elective II						
6	**IC1001**	Adaptive Control	3	0	0	3
7	**CS1034**	Visual Languages and Applications	3	0	0	3
8	**EI1002**	Aircraft Instrumentation	3	0	0	3
9	**EI1003**	Instrumentation in Petrochemical Industries	3	0	0	3
10	**EC1020**	Embedded System Design	3	0	0	3
Elective III						
11	**CS1031**	Operating Systems	3	0	0	3
12	**IC1004**	Robotics and Automation	3	0	0	3
13	**IC1003**	Optimal Control	3	0	0	3
14	**CS1033**	Data Communication and Networks	3	0	0	3
15	**IC1014**	Industrial Drives and Control	3	0	0	3
Elective IV						
16	**EI1004**	Instrumentation in Paper Industries	3	0	0	3
17	**IC1007**	Instrumentation and Control in Power Systems	3	0	0	3
18	**EI1005**	Telemetry and Telecontrol	3	0	0	3
19	**EI1006**	Instrumentation for Pollution Control	3	0	0	3
20	**EI1007**	Instrumentation and Control in Iron and Steel Industries	3	0	0	3

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Regulations 2008

Syllabus

B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

SEMESTER III

MA1201 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to EEE, EIE, ICE)

L	T	P	C
3	1	0	4

UNIT I FOURIER SERIES **9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM **9**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation of partial differential equations – Lagrange's linear equation – Solution of standard types of first order partial differential equations – Linear partial differential equations of second and higher order with constant coefficients

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat equation (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V Z-TRANSFORM AND DIFFERENCE EQUATIONS **9**

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

L: 45 T: 15 Total: 60

TEXTBOOKS

1. Grewal, B.S., "Higher Engineering Mathematics", 39th Edition, Khanna Publishers, Delhi, 2007.
2. Bali, N.P. and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications (P) Ltd, 2008.

REFERENCES

1. Ramana, B.V., "Higher Engineering Mathematics", 2nd Edition, Tata McGraw Hill, New Delhi, 2008.
2. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics" 8th Edition, Wiley India, 2007.

HS1201 – ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to EEE, EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Definition – Scope and importance – Need for public awareness – Forest resources – Use and over – Exploitation – Deforestation – Case studies – Timber extraction – Mining – Dams and their ground water – Floods – Drought – Conflicts over water – Dams – Benefits and problems – Mineral resources – Use effects on forests and tribal people – Water resources – Use and over-utilization of surface and exploitation – Environmental effects of extracting and using mineral resources – Case studies – Food resources – World food problems – Changes caused by agriculture and overgrazing – Effects of modern agriculture – Fertilizer – Pesticide problems – Water logging, salinity – Case studies – Energy resources – Growing energy needs – Renewable and non renewable energy sources – Use of alternate energy sources – Case studies – Land resources – Land as a resource – Land degradation – Man induced landslides – Soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT II ECOSYSTEMS AND BIODIVERSITY 9

Concepts of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (A) forest ecosystem (B) grassland ecosystem (C) desert ecosystem (D) aquatic ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to biodiversity – Definition genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity – Consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – Hot-Spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT III ENVIRONMENTAL POLLUTION 9

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of Urban and Industrial Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management:- Floods, Earthquake, Cyclone and Landslides

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From unsustainable to sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people, its problems and concerns, case studies – Environmental ethics:- issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – Wasteland reclamation – Consumerism and waste products – Environment production act – Air (Prevention and control of pollution) act – Water (Prevention and control of pollution) act – Wildlife protection act – Forest conservation act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV /AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Field study of local area to document environmental assets – River/forest/grassland/hill/ mountain.

Field study of common plants, insects and birds – Field study of simple ecosystems – Pond, river, hill slopes, etc.

Field study of local polluted site – Urban/rural/industrial/agricultural.

Total: 45

TEXT BOOKS

1. Masters, G.M., "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.
2. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co.
3. Townsend, C., Harper, J. and Begon, M., "Essentials of Ecology", Blackwell Science, 2003.
4. Trivedi, R.K. and Goel, P.K., "Introduction to Air Pollution", Techno-Science Publications.

REFERENCES

1. Erach, B., "The Biodiversity of India", Mapin Publishing Pvt. Ltd.,
2. Trivedi, R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, Envio Media.
3. Cunningham, Cooper, W.P. and Gorhani, T.H., "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.
4. Wages, K.D., "Environmental Management", W.B. Saunders Co.,

EE1202 – ELECTRICAL MACHINES

(Common to EEE, EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I D.C. MACHINES 9

Construction of D.C. Machines – Principle and theory of operation of D.C. generator – EMF equation – Characteristics of D.C. generators – Armature reaction – Commutation – Principle of operation of D.C. motor – Voltage equation – Torque equation – Types of D.C. motors and their characteristics – Starters – Speed control of D.C. motors – Applications.

UNIT II TRANSFORMERS 9

Principle – Theory of ideal transformer – EMF equation – Construction details of shell and core type transformers – Tests on transformers – Equivalent circuit – Phasor diagram – Regulation and efficiency of a transformer – Introduction to three-phase transformer connections.

UNIT III SYNCHRONOUS MACHINES 9

Principle of alternators – Construction details – Equation of induced EMF and Phasor diagram – Synchronous motor – Starting methods – Torque – V-curves – Speed control – Hunting

UNITIV INDUCTION MACHINES 9

Induction motor – Construction and principle of operation – Classification of induction motor – Torque equation – Condition for maximum torque – Equivalent Circuit – Starting methods and Speed control of induction motors.

UNIT V SPECIAL MACHINES 9

Types of single phase motor – Double revolving field theory – Cross field theory – Capacitor start capacitor run motors – Shaded pole motor – Repulsion type motor – Universal motor – Hysteresis motor – Permanent magnet synchronous motor – Switched reluctance motor – Brushless D.C. motor.

Total: 45

TEXT BOOKS

1. Nagrath I.J., and Kothari, D.P., “Electrical Machines”, Tata McGraw Hill, 1997.
2. Fitzgerald A.E, Kingsley C., and Umans S.D., “Electric Machinery”, McGraw Hill, Singapore, 2000.

REFERENCES

1. Theraja, B.L., “A Text book of Electrical Technology”, Vol.II, S.Chand and Co., , 2007.
2. Del Toro, V., “Electrical Engineering Fundamentals”, Prentice Hall of India, , 1995.
3. Cotton, H., “Advanced Electrical Technology”, Sir Isaac Pitman and Sons Ltd., London, 1999.

EC1209 – ELECTRON DEVICES AND CIRCUITS

(Common to EEE, EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I SEMICONDUCTOR DIODE AND BJT 9

PN Junction – Current components in a PN diode – Junction capacitance – Junction diode switching time – Zener diode – Varactor diode – Tunnel diode – Schottky diode – Transistor Structure – Basic Transistor operation – Transistor characteristics and parameters – Transistor as a switch and amplifier – Transistor bias circuit – Voltage divider bias circuits – Base bias circuits – Emitter bias circuits – Collector feedback bias circuits – DC load line – AC load line – Bias stabilization – Thermal runaway and thermal stability.

UNIT II FET, UJT and SCR 9

JFET characteristics and parameters – JFET biasing – Self bias – Voltage divider bias – Q point – Stability over temperature – MOSFET – D-MOSFET and E-MOSFET – MOSFET characteristics and parameters – MOSFET biasing – Zero bias – Voltage divider bias – Drain feedback bias – Characteristics and applications of UJT, SCR, DIAC, TRIAC.

UNIT III AMPLIFIERS 9

CE, CC and CB amplifiers – Small-signal low frequency transistor amplifier circuits – h-parameter representation of a transistor – Analysis of single stage transistor amplifier circuits – Voltage gain – Current gain – Input impedance and output impedance – Frequency response – RC coupled amplifier – Classification of Power amplifiers – Class A, B, AB and C Power amplifiers – Push-Pull and Complementary-Symmetry amplifiers – Design of power output, efficiency and cross-over distortion.

UNIT IV FEEDBACK AMPLIFIERS AND OSCILLATORS 9

Advantages of negative feedback – Voltage/current, series/shunt feedback – Positive feedback – Conditions for oscillation – Phase shift – Wein Bridge – Hartley – Colpitts and Crystal oscillators.

UNIT V PULSE CIRCUITS AND POWER SUPPLY 9

RC wave shaping circuits – Diode clampers and clippers – Multivibrators – Schmitt triggers – UJT saw-tooth oscillators – Single and poly-phase rectifiers and analysis of filter circuits – Design of zener and transistor series voltage regulators – Switched mode power supplies.

Total: 45

TEXT BOOKS

1. Robert T. Paynter, "Introductory Electronic Devices and Circuits", 7th Edition**,** Pearson Education, 2006.
2. Millman and Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, 2007.

REFERENCES

1. Mottershead, A., "Electronic Devices and Circuits an Introduction", Prentice Hall of India, 2003.
2. Boylsted and Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall of India, 6th Edition, 1999.
3. Bell, D.A., "Electronic Devices and Circuits", Oxford University Press, 4th Edition, 1999.

CS1201 – DATA STRUCTURES

(Common to EEE, EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I FUNDAMENTALS OF ALGORITHMS 8

Algorithm – Analysis of Algorithm – Best Case and Worst Case Complexities – Analysis of Algorithm using Data Structures – Performance Analysis – Time Complexity – Space Complexity – Amortized Time Complexity – Asymptotic Notation

UNIT II FUNDAMENTALS OF DATA STRUCTURES 9

Arrays – Structures – Stacks – Definition and examples – Representing Stacks – Queues and Lists – Queue and its Representation – Applications of Stack – Queue and Linked Lists.

UNIT III TREES 10

Binary Trees – Operations on Binary Tree Representations – Node Representation – Internal and External Nodes – Implicit Array Representation – Binary Tree Traversal – Huffman Algorithm – Representing Lists as Binary Trees – Sorting and Searching Techniques – Tree Searching – Hashing

UNIT IV GRAPHS AND THEIR APPLICATIONS 9

Graphs – An Application of Graphs – Representation – Transitive Closure – Warshall's Algorithm – Shortest path Algorithm – A Flow Problem – Dijikstra's Algorithm – Minimum Spanning Trees – Kruskal and Prim's Algorithm – An Application of Scheduling – Linked Representation of Graphs – Graph Traversals

UNIT V STORAGE MANAGEMENT 9

General Lists – Operations – Linked List Representation – Using Lists – Freeing List Nodes – Automatic List Management : Reference Count Method – Garbage Collection – Collection and Compaction

Total: 45

TEXT BOOKS

1. Cormen T.H., Leiserson, C.E. and Rivest, R.L., "Introduction to Algorithms", Prentice Hall of India, 2007.
2. Weiss, M.A., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2005.

REFERENCES

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorthims/C++", 2nd Edition, Universities Press (India) Private Limited, 2007.
2. Aho, A.V., Hopcroft, J.E. and Ullman, J.D., "Data Structures and Algorithms", 1st Edition, Pearson Education, 2003.
3. Gilberg, R.F. and Forouzan, B.A., "Data Structures", 2nd Edition, Thomson India Edition, 2005.
4. Robert L. Kruse, Bruce P. Leung and Clovin L. Tondo, "Data Structures and Program Design in C", Pearson Education, 2004.
5. Tanaenbaum, A.S., Langram, Y. and Augestein, M.J, "Data Structures using C", Pearson Education, 2004.

EI1201 – ELECTRICAL MEASUREMENTS

(Common to EIE and ICE)

L	T	P	C
3	1	0	4

UNIT I MEASUREMENT OF VOLTAGE AND CURRENT 9

Galvanometers – Ballistic, D'Arsonval galvanometer – Theory, Calibration and applications – Construction, Operation and Comparison of moving coil and moving iron meters – Dynamometer instruments – Induction type and thermal type meter – Rectifier type – Extension of range of voltmeter and ammeter – Errors and compensation.

UNIT II MEASUREMENT OF POWER AND ENERGY 9

Electrodynamometer type wattmeter – Theory – Errors – Methods of correction – LPF wattmeter – Phantom loading – Induction type kWh meter – Induction type energy meter – Calibration of wattmeter.

UNIT III POTENTIOMETERS AND INSTRUMENT TRANSFORMERS 9

D.C potentiometer – Basic circuit – Standardization – Laboratory type (Crompton's) – A.C potentiometer – Drysdale (polar type) type – Gall-Tinsley (coordinate) type – Limitations – Applications – C.T and P.T construction – Theory – Operation and characteristics.

UNIT IV RESISTANCE MEASUREMENT 9

Measurement of low, medium and high resistance – Ammeter-voltmeter method – Wheatstone bridge – Kelvin double bridge – Series and shunt type ohmmeter – High resistance measurement – Megger – Direct deflection methods – Price's guard-wire method – Earth resistance measurement.

UNIT V IMPEDANCE MEASUREMENT 9

A.C bridges – Measurement of inductance, capacitance – Q of coil – Maxwell bridge – Wein's bridge – Schering bridge – Anderson bridge – Campbell bridge to measure mutual inductance – Errors in A.C. bridge methods and their compensation – Detectors – Excited field – A.C. galvanometer – Vibration galvanometer

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Golding, E.W. and Widdis, F.C., "Electrical Measurements and Measuring Instruments", A.H.Wheeler and Co, 2001.
2. Sawhney, A.K., "Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai and Co, 2004.

REFERENCES

1. Gupta, J.B., "A Course in Electronic and Electrical Measurements and Instrumentation", S.K. Kataria and Sons, Delhi, 2003.
2. Singh, S.K., "Industrial Instrumentation and control", Tata McGraw Hill, 2nd Edition, 2002.
3. Kalsi, H.S., "Electronic Instrumentation", Tata McGraw Hill, 2004.
4. Martin U. Reissland, "Electrical Measurement-Fundamental Concepts and Applications", New Age International, 2001.

EC1210 – ELECTRON DEVICES AND CIRCUITS LABORATORY

(Common to B.E – EEE, EandI, IandC)

(Revised)

L	T	P	C
0	0	3	2

1. Characteristics of Semiconductor diode and Zener diode.
2. Characteristics of Transistor under common emitter, common collector and Common base configurations.
3 Characteristics of FET.
4 Characteristics of UJT.
5 Characteristics of SCR, DIAC and TRIAC.
6 Photo diode, phototransistor Characteristics and study of light activated relay circuit.
7 Static characteristics of Thermistors
8 Single phase half wave and full wave rectifiers with inductive and capacitive filters.
9 Differential amplifiers using FET.
10 Study of CRO.
11 Series and Parallel resonance circuits.
12 Realization of Passive filters.

Total: 45

CS1203 – DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Implement singly and doubly linked lists.
2. Represent a polynomial as a linked list and write functions for polynomial addition.
3. Implement stack and use it to convert infix to postfix expression
4. Implement a double-ended queue (dequeue) where insertion and deletion operations are possible at both the ends.
5. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
6. Implement binary search tree.
7. Implement insertion in AVL trees.
8. Implement priority queue using binary heaps
9. Implement hashing with open addressing.
10. Implement Prim's algorithm using priority queues to find MST of an undirected graph.

Total: 45

EE1203 – ELECTRICAL MACHINES LABORATORY

L	T	P	C
0	0	3	2

1. Open circuit characteristic of DC Shunt Generator
2. Load test on DC Shunt Generator
3. Speed control of DC Shunt Motor
4. Brake test on DC Shunt Motor
5. Brake test on DC Series Motor
6. Regulation characteristic of three-phase Alternator
7. Open circuit and short circuit tests on single-phase Transformer
8. Load test on single-phase Transformer
9. Load test on three-phase Induction Motor
10. Brake test on single-phase Induction Motor
11. 'V' curves of Synchronous Motor
12. Power measurement in three-phase circuit using two-wattmeter method

Total: 45

SEMESTER IV

EE1253 – CONTROL SYSTEMS

(Common to EEE, EIE , ICE)

L	T	P	C
3	1	0	4

UNIT I SYSTEMS AND THEIR REPRESENTATION 9

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE 9

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feed back control.

UNIT III FREQUENCY RESPONSE 9

Frequency response – Bode plot – Polar plot – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications.

UNIT IV STABILITY OF CONTROL SYSTEM 9

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin – Nyquist stability criterion.

UNIT V COMPENSATOR DESIGN 9

Performance criteria – Lag, lead and lag – lead networks – Compensator design using bode plots.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Nagrath, I.J. and Gopal, M., “Control Systems Engineering”, New Age International Publishers, 2003
2. Benjamin C. Kuo, “Automatic Control Systems”, Pearson Education Asia, 2003.

REFERENCES

1. Ogata, K., “Modern Control Engineering”, 4th Edition, Prentice Hall of India, 2002.
2. Norman S. Nise, “Control Systems Engineering” 4th Edition, John Wiley, 2007.
3. Samarajit Ghosh, “Control Systems”, Pearson Education, 2004.
4. Gopal, M., “Control Systems, Principles and Design”, Tata McGraw Hill, 2002.

EI1251 – INDUSTRIAL INSTRUMENTATION I

(Common to EIE , ICE)

L	T	P	C
3	0	0	3

UNIT I MEASUREMENT OF FORCE, TORQUE AND VELOCITY 9

Electric balance – Different types of load cells – Hydraulic, pneumatic strain gauge – Magneto elastic and Piezo electric load cell – Different methods of torque measurements – Strain gauge – Relative angular twist – Speed measurement – Capacitive tacho – Dragcup type tacho – D.C and A.C tachogenerators – Stroboscope.

UNIT II MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY 9

Accelerometers – LVDT, piezo – Electric, strain gauge and variable reluctance type accelerometer – Mechanical type vibration instruments – Seismic instruments as an accelerometer – Vibrometers – Calibration of vibration pickups – Units of density and specific gravity – Baume scale, and API scale – Pressure head type densitometers – Float type densitometers – Ultrasonic densitometer – Bridge type gas densitometer.

UNIT III PRESSURE MEASUREMENT 9

Units of pressure – Manometers – Different types – Elastic type pressure gauges – Bourdon tube, bellows and diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo-resistive pressure sensor – Resonator pressure sensor – Measurement of vacuum – McLeod gauge – Thermal conductivity gauges – Ionization gauges: – Cold cathode type and hot cathode type – Testing and calibration of pressure gauges – Dead weight tester.

UNIT IV TEMPERATURE MEASUREMENT 9

Definitions and standards – Primary and secondary fixed points – Calibration of thermometers – Different types of filled in system thermometer – Sources of errors in filled in systems and their compensation – Bimetallic thermometers – Electrical methods of temperature measurement – Signal conditioning of industrial RTDs and their characteristics – 3 lead and 4 lead RTDs – Thermistors.

UNIT V THERMOCOUPLES AND RADIATION PYROMETERS 9

Thermocouples – Laws of thermocouple – Fabrication of industrial thermocouples – Signal conditioning of thermocouple output – Isothermal block reference junctions – Commercial circuits for cold junction compensation – Response of thermocouple – Special techniques for measuring high temperature using thermocouples – Radiation fundamentals – Radiation methods of temperature measurement – Total radiation pyrometers – Optical pyrometers – Two colour radiation pyrometers – Fiber optic temperature measurement.

Total: 45

TEXT BOOKS

1. Doebelin, E.O., “Measurement systems Application and Design”, International Student Edition, 5th Edition, McGraw Hill Book Company, 2004.
2. Jone’s “Instrument Technology”, Vol.2, Butterworth-Heinemann, International Edition, 2003.
3. Sawhney, A.K., “A Course in Electrical and Electronic Measurements and Instrumentation”, Dhanpath Rai and Co (P) Ltd, 2004.

REFERENCES

1. Liptak, B.G., “Instrumentation Engineers Handbook (Measurement)”, CRC Press, 2005.
2. Patranabis, D., “Principles of Industrial Instrumentation”, 2nd Edition, Tata McGraw Hill Publishing Company Ltd., 1999.
3. Holman, P., “Experimental Methods for Engineers”, 6th Edition, McGraw Hill Book Company, 2000.
4. Nakra, B.C., and Chaudry, K.K., “Instrumentation Measurement and Analysis”, TataMcGraw Hill Publishing Company Limited, 2004.

EI1251 – TRANSDUCER ENGINEERING

(Common to EIE , ICE)

L	T	P	C
3	0	0	3

UNIT I SCIENCE OF MEASUREMENTS AND INSTRUMENTATION OF TRANSDUCERS 9

Units and standards – Calibration methods – Static calibration – Classification of errors – Error analysis – Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics – Accuracy, precision, resolution, sensitivity, linearity – Dynamic characteristics – Mathematical model of transducer – Zero, I and II order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation – Construction details – Characteristics and application of potentiometer – Strain gauge, resistance thermometer, thermistor, hot-wire anemometer, piezoresistive sensor and humidity sensor.

UNIT IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCERANSDUCERS 9

Induction potentiometer – Variable reluctance transducers – EI pick up – Principle of operation, construction details – Characteristics and application of LVDT – Capacitive transducer and types – Capacitor microphone – Frequency response.

UNIT V OTHER TRANSDUCERS 9

Piezoelectric transducer – Hall Effect transducer – Different types of photo detectors – Digital transducers – Smart sensors – Fibre optic sensors, SQUID sensors, film sensors, MEMS, nano sensors.

Total: 45

TEXT BOOKS

1. Doebelin, E.A., “Measurement Systems - Applications and Design”, Tata McGraw Hill, 2000.
2. Sawhney, A.K., “A Course in Electrical and Electronic Measurement and Instrumentation”, Dhanpat Rai and Co (P) Ltd., 2004.

REFERENCES

1. Patranabis, D., “Sensors and Transducers”, Prentice Hall of India, 1999.
2. Bentley, J.P., “Principles of Measurement Systems”, 3rd Edition, Pearson Education, 2000.

EC1261 – DIGITAL LOGIC CIRCUITS

(Common to EEE, EIE)

L	T	P	C
3	1	0	4

UNIT I BOOLEAN ALGEBRA AND COMBINATIONAL CIRCUITS 9

Boolean algebra: De – Morgan's theorem, switching functions and simplification using K – maps and Quine McCluskey method, Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers.

UNIT II SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, D, JK and T. Analysis of synchronous sequential circuits – Design of synchronous sequential circuits – Counters, state diagram – State reduction – State assignment.

UNIT III ASYNCHRONOUS SEQUENCTIAL CIRCUIT 9

Analysis of asynchronous sequential machines – State assignment – Asynchronous design problem.

UNTI IV PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES 9

Memories – ROM, PROM, EPROM, PLA, PLD, FPGA – Digital logic families – TTL, ECL, CMOS.

UNIT V VHDL 9

RTL Design – Combinational logic – Types – Operators – Packages – Sequential circuit – Sub programs – Test benches. (Examples: adders, counters, flipflops, FSM, Multiplexers / Demltiplexers).

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Raj Kamal, "Digital Systems - Principles and Design", 2nd Edition, Pearson Education, 2007.
2. Morris Mano, "Digital Design", Pearson Education, 2006.
3. Yarbrough, J.M., "Digital Logic, Application and Design", Thomson, 2002.

REFERENCES

1. Roth, C.H., "Fundamentals Logic Design", 4th Edition, Jaico Publishing, 2002.
2. Floyd and Jain, "Digital Fundamentals", 8th Edition, Pearson Education, 2003.
3. Wakerly, J.F., "Digital Design Principles and Practice", 3rd Edition, Pearson Education, 2002.
4. Tocci, "Digital Systems: Principles and Applications", 8th Edition, Pearson Education.

EC1260 – LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

(Common to EEE, EIE , ICE)

L	T	P	C
3	0	0	3

UNIT I IC FABRICATION 9

IC classification – Fundamental of monolithic IC technology – Epitaxial growth – Masking and etching, diffusion of impurities – Realisation of monolithic ICs and packaging – Fabrication of diodes, capacitance, resistance and FETs.

UNIT II CHARACTERISTICS OF OP-AMP 9

Ideal OP-AMP characteristics – DC characteristics – AC characteristics – Offset voltage and current – Voltage series feedback and shunt feedback amplifiers – Differential amplifier – Frequency response of OP- AMP – Basic applications of OP – AMP – Summer – Differentiator and integrator.

UNIT III APPLICATIONS OF OP-AMP 9

Instrumentation amplifier – First and second order active filters – V/I and I/V converters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R – 2R ladder and weighted resistor types), A/D converter – Dual slope – Successive approximation and flash types.

UNIT IV SPECIAL ICs 9

555 Timer circuit – Functional block – Characteristics and applications; 566 – Voltage controlled oscillator circuit; 565 – Phase lock loop circuit functioning and applications – Analog multiplier ICs.

UNIT V APPLICATION ICs 9

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.

Total: 45

TEXT BOOKS

1. Ramakant A. Gayakward, “OP-AMPS and Linear Integrated Circuits”, 4th Edition, Pearson Education, PHI, 2000.
2. Roy Choudhary, D. and Sheil B. Jani, “Linear Integrated Circuits”, 2nd Edition, New Age International, 2003.

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”, 4th Edition, Pearson Education, Prentice Hall of India, 2002.
3. David A. Bell, “OP-AMP Linear ICs”, 2nd Edition, Prentice Hall of India, 1997.

ME1260 – APPLIED THERMODYNAMICS

(Common to EEE, EIE , ICE)

L	T	P	C
3	1	0	4

UNIT I BASIC CONCEPTS AND LAWS OF THERMODYNAMICS 9

Classical approach – Thermodynamic systems – Control volume – System and surroundings – Universe – Properties – State – Process – Cycle – Equilibrium – Work and heat transfer – Point and path functions – First law of thermodynamics for open and closed systems – First law applied to a control volume – SFEE equations [steady flow energy equation – Second law of thermodynamics – Heat engines – Refrigerators and heat pumps – Carnot cycle – Carnot theorem.

UNIT II IC ENGINES 9

Air standard cycles – Otto, diesel and dual cycles and comparison of efficiency – Working Principle of four stroke and two stroke engines – Working principle of spark ignition and compression ignition engines – Application of IC engines.

UNIT III STEAM BOILERS AND TURBINES 9

Formation of steam – Properties of steam – Use of steam tables and charts – Steam power cycle (Rankine) – Modern features of high – Pressure boilers – Mountings and accessories – Testing of boilers – Steam turbines – Impulse and reaction principle – Velocity diagrams – Compounding and governing methods of steam turbines (qualitative treatment only) – Layout and working principle of a steam power plant.

UNIT IV COMPRESSORS, REFRIGERATION AND AIR CONDITIONING 9

Positive displacement compressors – Reciprocating compressors – Indicated power – Clearance volume – Various efficiencies – Clearance ratio – Volume rate – Conditions for perfect and imperfect intercooling – Multi stage with intercooling – Rotary positive displacement compressors – Construction and working principle of centrifugal and axial flow compressors – Refrigeration – Various methods of producing refrigerating effects (RE) – Vapour compression cycle – P-H and T–S diagram – Saturation cycles – Effect of subcooling and super heating – (qualitative treatment only) – Airconditioning systems – Basic psychrometry – Simple psychrometric processes – Types of airconditioning systems – Selection criteria for a particular application (qualitative treatment only).

UNIT V HEAT TRANSFER 9

One-dimensional Heat Conduction – Plane wall – Cylinder – Sphere – Composite walls – Critical thickness of insulation – Heat transfer through extended surfaces (simple fins) – Convection – Free convection and forced convection – Internal and external flow – Simple Empirical relations.Radiation – Black-Gray bodies – Radiation Shape Factor (RSF) – Cooling of electronic components – Thermoelectric cooling – Chip cooling.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Khurmi, R.S. and Gupta, J.K., “Thermal Engineering”, S.Chand and Co. Ltd., 2006.
2. Domkundwar, S., Kothandaraman, C.P. and Domkundwar, A.V., “Thermal Engineering”, Dhanpat Rai and Co., 2002.

REFERENCES

1. Rogers and Mayhew, “Engineering Thermodynamics-Work and Heat Transfer”, Pearson Education Pvt. Ltd., 2006.
2. Eastop and McConkey, “Applied Thermodynamics”, Pearson Education Pvt. Ltd., 2002.
3. Nag, P.K., “Engineering Thermodynamics”, Tata McGraw Hill, 2003.
4. Rajput, B.K. and Sankaar, “Thermal Engineering”, S.Chand and Co. Ltd., 2003.

EI1253 – TRANSDUCERS AND MEASUREMENTS LABORATORY

L	T	P	C
0	0	3	2

1. Displacement versus output voltage characteristics of a potentiometer transducer.

2. Characteristics of Strain gauge and Load cell.

3. Characteristics of LVDT, Hall effect transducer and Photoelectric tachometer.

4. Characteristic of LDR, thermistor and thermocouple.

5. Step response characteristic of RTD and thermocouple and Study of smart transducers.

6. Wheatstone and Kelvin's bridge for measurement of resistance.

7. Schering Bridge for capacitance measurement and Anderson Bridge for inductance measurement.

8. Calibration of Single-phase Energy meter and wattmeter.

9. Calibration of Ammeter and Voltmeter using Student type potentiometer.

10. Design, Construction and calibration of series and shunt type ohmmeters.

Total: 45

ME1261 – THERMODYNAMICS LABORATORY

L	T	P	C
0	0	3	2

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).
8. Test to estimate frictional losses in pipe flow.
9. Test on reaction turbine for obtaining the characteristics curves and to design values of specific speed, discharge, output and efficiency.
10. Test on impulse turbine to obtain its characteristics curves and hydraulic design values.

Total: 45

EC1262 – LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

1. Study of Basic Digital IC's. (Verification of truth table for AND, OR, EXOR, NOT, NOR, NAND, JK FF, RS FF, D FF)

2. Implementation of Boolean Functions, Adder/ Subtractor circuits.

3 (a) Code converters, Parity generator and parity checking, Excess – 3, 2s Complement, Binary to Gray code using suitable IC's .

(b) Encoders and Decoders.

4. Counters: Design and implementation of 4 – bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.

5 Shift Registers:
Design and implementation of 4 – bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.

6 Multiplex/ De – multiplex:
Study of 4:1; 8:1 multiplexer and Study of 1:4; 1:8 demultiplexer

7 Timer IC application:
Study of NE/SE 555 timer in Astable, Monostable operation.

8. Application of Op – Amp:
Slew rate verifications, inverting and non – inverting amplifier,
Adder, comparator, Integrater and Differentiator.

9 Study of Analog to Digital Converter and Digital to Analog Converter: Verification of A/D conversion using dedicated IC's.

10 Study of VCO and PLL ICs:

i. Voltage to frequency characteristics of NE/ SE 566 IC.

ii. Frequency multiplication using NE/SE 565 PLL IC.

Total: 45

SEMESTER V

MG1301 – TOTAL QUALITY MANAGEMENT

(Common to EEE, EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I QUALITY **9**

Definition of quality – Dimensions of quality – Quality planning – Quality costs – Analysis techniques for quality costs – Basic concepts of total quality management – Historical review – Principles of TQM – Leadership – Concepts – Role of senior management – Quality council – Quality statements – Strategic planning – Deming philosophy – Barriers to TQM implementation.

UNIT II TQM PRINCIPLES **9**

Customer satisfaction – Customer perception of quality – Customer complaints – Service quality – Customer retention – Employee involvement – Motivation – Empowerment – Teams – Recognition and reward – Performance appraisal – Benefits – Continuous process improvement – Juran trilogy – PDSA cycle – 5S-Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy – Performance measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma – New seven management tools.

UNIT IV TQM TOOLS **9**

Benchmarking – Reasons to benchmark – Benchmarking process – Quality Function Deployment (QFD) – House of quality – QFD process – Benefits – Taguchi quality loss function – Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA – Stages of FMEA.

UNIT V QUALITY SYSTEMS **9**

Need for ISO 9000 and other quality systems – ISO 9000:2000 quality systems –Elements, implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 – Concept – Requirements and benefits.

Total: 45

TEXT BOOKS

1. Besterfiled, D.H., “Total Quality Management”, 3rd Edition, Pearson Education, 2004.
2. Narayana V. and Sreenivasan N.S, “Quality Management-Concepts and Tasks”, New Age International, 1996.

REFERENCES

1. Evans, J.R. and Lidsay, W.M., “The Management and Control of Quality”, 5th Edition, South-Western (Thomson Learning), 2002.
2. Feigenbaum, A.V., “Total Quality Management”, McGraw Hill, 1991.
3. Oakland, J.S., “Total Quality Management”, Butterworth-Heinemann Ltd., 1989.

EC1307 – DIGITAL SIGNAL PROCESSING

(Common to EEE, EIE, ICE.)

L	T	P	C
3	1	0	4

UNIT I SIGNALS 9

Classification of systems – Continuous – Discrete – Linear – Causal – Stable – Dynamic – Recursive – Time variance – Classification of signals – Continuous and discrete – Energy and power – Mathematical representation of signals – Spectral density – Sampling techniques – Quantization – Quantization error – Nyquist rate – Aliasing effect – Digital signal representation – Analog to digital conversion**.**

UNIT II DISCRETE TIME SYSTEM ANALYSIS 9

z-transform and its properties – Inverse Z-transforms – Difference equation – Solution by Z-transform – Application to discrete systems – Stability analysis – Frequency response – Convolution – Fourier transform of discrete sequence – Discrete Fourier series.

UNIT III DISCRETE FOURIER TRANSFORM and COMPUTATION 9

DFT properties – Magnitude and phase representation – Computation of DFT using FFT algorithm – DIT and DIF – FFT using radix-2 – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS 9

FIR and IIR filter realization – Parallel and cascade forms – FIR design – Windowing Techniques – Need and choice of windows – Linear phase characteristics – IIR design – Analog filter design – Butterworth and Chebyshev approximations – Digital design using impulse invariant and bilinear transformation – Warping – Prewarping – Frequency transformation.

UNIT V PROGRAMMABLE DSP CHIPS 9

Architecture and features of TMS320C54X signal processing chip – Quantization effects in designing digital filters.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Proakis, J.G. and Manolakis, D.G., “Digital Signal Processing Principles, Algorithms and Applications”, Pearson Education / Prentice Hall of India, 2003
2. Mitra, S.K., “Digital Signal Processing – A Computer Based Approach”, Tata McGraw Hill, 2001.

REFERENCES

1. Alan V. Oppenheim, Ronald W. Schafer and John R. Buck, “Discrete-Time Signal Processing”, Pearson Education, 2003
2. Venkataramani, B., Bhaskar, M., “Digital Signal Processors, Architecture, Programming and Applications”, Tata McGraw Hill, 2003
3. Salivahanan, S., Vallavaraj, A. and Gnanapriya,C, “Digital Signal Processing”, Tata McGraw Hill, 2003
4. Texas TMS320C54X user manual (website).

EC1308 – PRINCIPLES OF COMMUNICATION ENGINEERING

(Common to EEE, EIE, ICE.)

L	T	P	C
3	0	0	3

UNIT I AMPLITUDE MODULATION 9

Principles of amplitude modulation – AM envelope – frequency spectrum and bandwidth – modulation index and percent modulation – AM power distribution – AM modulator circuits – low level AM modulator – Medium power AM modulator – AM transmitters – Low level transmitters – High level transmitters – Receiver parameters – AM receivers – TRF – Super heterodyne receivers – Double conversion AM receivers.

UNIT II ANGLE MODULATION 9

Angle modulation – FM and PM waveforms – Phase deviation and modulation index – Frequency deviation – Phase and frequency modulators and demodulators – Frequency spectrum of angle modulated waves – Bandwidth requirement – Broadcast band FM – Average power FM and PM modulators – Direct FM and PM – Direct FM transmitters – Indirect transmitters – Angle modulation Vs. amplitude modulation – FM receivers FM demodulators – PLL FM demodulators – FM noise suppression – Frequency Vs. phase modulation.

UNIT III DIGITAL MODULATION 9

Introduction – Binary PSK – DPSK – Differentially encoded PSK – QPSK – M-ary PSK – Binary FSK – MSK – GMSK – Duobinary encoding – Performance comparison of various systems of digital modulation.

UNIT IV BASEBAND DATA TRANSMISSION 9

Sampling theorem – Quadrature sampling of bandpass signals – Reconstruction of message from its samples – Signal distortion in sampling – Discrete PAM signals – Power spectra of discrete PAM signals – ISI Nyquist criterion for distortion less baseband binary transmission – Eye pattern – baseband M-ary PAM systems – Adaptive equalization for data transmission.

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction – Pseudo – Noise sequence – DS spread spectrum with coherent binary PSK – processing gain – FH spread spectrum – Multiple access techniques – Wireless communications – TDMA and CDMA – Wireless communication systems – Source coding of speech for wireless communications.

Total: 45

TEXT BOOKS

1. Wayne Tomasi, “Electronic Communication Systems Fundamentals Through Advanced”, Pearson Education, 2001.
2. Simon Haykin, “Digital Communications”, John Wiley and Sons, 2003.

REFERENCES

1. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley and Sons, 2001.
2. Taub and Schilling, “Principles of Communication Systems”, 2nd Edition, Tata McGraw-Hill, 2003.
3. Martin S.Roden, “Analog and Digital Communication System”, 3rd Edition, Prentice Hall of India, 2002.
4. Blake, “Electronic Communication Systems”, 2nd Edition, Thomson Delman, 2002.

CS1312 – OBJECT ORIENTED PROGRAMMING

(Common to EEE, EIE, ICE.)

L	T	P	C
3	0	0	3

UNIT I FUNDAMENTALS 9

Object oriented programming concepts – Encapsulation – Programming elements – Program structure – Enumeration types – Functions and pointers – Function invocation – Overloading functions – Scope and storage class – Pointer types – Arrays and pointers – Call-by-reference – Assertions – Standard template library.

UNIT II IMPLEMENTING ADTS AND ENCAPSULATION 9

Aggregate type structure – Structure pointer operators – Unions – Bit fields – Data handling and member functions – Classes – Constructors and destructors – Static member – This pointer – Reference semantics – Implementation of simple ADTs.

UNIT III POLYMORPHISM 9

ADT conversions – Overloading – Overloading operators – Unary operator overloading – Binary operator overloading – Function selection – Pointer operators.

UNIT IV INHERITANCE 9

Derived class – Typing conversions and visibility – Code reuse – Virtual functions – Run-time type identifications – Exception – Handlers – Standard exceptions.

UNIT V TEMPLATES AND FILE HANDLING 9

Template class – Function templates – Class templates – C++ streams – Console streams – Console stream classes – Formatted and unformatted console I/O operations – Manipulators – File streams – Classes file modes – File pointers and manipulations – File I/O – Exception handling.

Total: 45

TEXT BOOKS

1. Ira Pohl, “Object-Oriented Programming Using C++”, Pearson Education, 2nd Edition, 2003.
2. Venugopal, K.R., Buyya, R. and Ravishankar, T., “Mastering C++”, Tata McGraw Hill, 2003.

REFERENCES

1. Ashok, B. and Kamthane, N., “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education, 2006.
2. Stroustrup, “The C++ Programming Language”, Addison Wesley, 2000.
3. Hubbard, J.R., “Programming with C++”, Schaums Outline Series, Tata McGraw Hill, 2003.

EI1301 – ELECTRONIC INSTRUMENTATION

(Common to EIE and ICE)

L	T	P	C
3	1	0	4

UNIT I ANALOG METERS 9

D.C, A.C voltmeters – Ammeters – Multimeter – Power meter – Q-meter – True RMS meter – Vector impedance meter – Vector voltmeter – Component measuring instrument.

UNIT II SIGNAL GENERATORS AND ANALYZERS 9

Sine wave generator – Frequency synthesized sine wave generator – Sweep frequency generator, pulse and square wave generator – Function generator – Wave analyzer – Applications – Harmonic distortion analyzer – Spectrum analyzer – Applications – Audio Frequency generator – Noise generator.

UNIT III CATHODE RAY OSCILLOSCOPE 9

General purpose oscilloscope – Screens for CRT graticules – Vertical and horizontal deflection systems – Delay line – Multiple trace – Dual beam and dual trace – Probes – Oscilloscope techniques – Special oscilloscopes – Storage oscilloscopes – Sampling oscilloscope – Digital CRO.

UNIT IV DIGITAL INSTRUMENTS 9

Digital method for measuring frequency period – Phase difference – pulse width – Time interval, total count – Digital voltmeter – Types – Automatic polarity indication – Automatic ranging, auto zeroing – DMM – Microprocessor based DMM – DPM – IEEE 488 bus.

UNIT V DISPLAY AND RECORDING DEVICES 9

Bar graph display – Segmental and dot matrix display – X–Y recorders – magnetic tape recorders – Digital recording – Data loggers. Interference and screening – Electrostatic and electromagnetic interference and earth loops.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Albert D. Helfrick and William D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, 2002.
2. Bouwens, A.J., “Digital Instrumentation”, Tata McGraw Hill, 1997

REFERENCES

1. Oliver, B.M. and Cage. J.M., “Electronic Measurements and Instrumentation”, McGraw Hill International Edition, 1975.
2. Joseph J. Carr, “Elements of Electronic Instrumentation and Measurements”, 3rd Edition, Pearson Education, 2003.
3. Rangan, C.S., Sarma, G.R. and Mani, V.S.V., “Instrumentation Devices and Systems”, Tata McGraw Hill, 2002 .
4. Bell, D.A., “Electronic Instrumentation and Measurements”, Prentice Hall of India, 2002.
5. Rajendra Prasad, “Electronic Measurements and Instrumentation”, Khanna Publishers, 2003.
6. Gupta, B.R., “Electronics and Instrumentation”, S. Chand Co. (P) Ltd., 2003.

EI1302 – INDUSTRIAL INSTRUMENTATION II

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I MEASUREMENT OF HUMIDITY and MOISTURE 9

Humidity terms – Dry and wet bulb psychrometers – Hot wire electrode type hygrometer – Dew cell – Electrolysis type hygrometer – Commercial type dew point meter – Moisture terms – Different methods of moisture measurement – Moisture measurement in granular materials – Solid penetrable materials like wood – Web type material

UNIT II MECHANICAL TYPE FLOW METERS 9

Theory of fixed restriction valuable head type flow meters – Orifice plate – Venturi tube – Flow nozzle – Dall tube – Installation of head flow meters – Piping arrangement for different fluids – Pitot tube.

UNIT III QUANTITY METERS, AREA FLOW METERS AND MASS FLOW METERS 9

Positive displacement flow meters – Constructional details and theory of operation of mutating disc – Reciprocating piston – Oval gear and helix type flow meters – Inferential meter – Turbine flow meter – Rotameter – Theory and installation – Angular momentum mass flow meter – Coriolis mass flow meters – Thermal mass flow meters – Volume flow meter plus density measurement – Calibration of flow meters – Dynamic weighing method

UNIT IV ELECTRICAL TYPE FLOW METER 9

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 measurement – Guidelines for selection of flow meter

UNIT V LEVEL MEASUREMENT 9

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

Total: 45

TEXT BOOKS

1. Patranabis, D., “Principles of Industrial Instrumentation”, Tata McGraw Hill, 1999.
2. Jain, R.K., “Mechanical and Industrial Measurements”, Khanna Publishers, 1999.

REFERENCES

1. Sawhney, A.K. and Sawhney, P., “A Course on Mechanical Measurement, Instrumentation and Control”, Dhanpat Rai and Co, 2004.
2. Eckman, D.P., “Industrial Instrumentation”, Wiley Eastern Limited, 1975.
3. Alan S. Morris, “Principles of Measurement and Instrumentation”, Prentice Hall of India, 2003.
4. Nakra, B.C. and Chaudry, K.K., “Instrumentation, Measurement and Analysis”, Tata McGraw Hill, 2004
5. Liptak, B.G., “Instrument Engineers Hand Book (Measurement)”, Chilton Book Co

EC1309 – DIGITAL SIGNAL PROCESSING LABORATORY

(Common to EEE,EIE and ICE.)

L	T	P	C
0	0	3	2

1. Study of various Addressing Modes of DSP using Simple Programming Examples
2. Sampling of Input Signal and Display
3. Implementation of FIR Filter
4. Calculation of FFT
5. Generation of Signals using MATLAB
6. Linear and Circular Convolution of Two Sequences using MATLAB
7. Sampling and Effect of Aliasing using MATLAB
8. Design of FIR Filters using MATLAB
9. Design of IIR Filters using MATLAB
10. Calculation of FFT of a Signal using MATLAB
11. FIR Filter Implementation using TMS320XX Processor
12. IIR Filter Implementation using TMS320XX Processor

Total: 45

CS1313 – OBJECT ORIENTED PROGRAMMING LABORATORY

(Common to EEE,EIE and ICE.)

L	T	P	C
0	0	3	2

1. Programs Using Functions
   - Functions with Default Arguments
   - Implementation of Call by Value, Call by Address

2. Simple Classes for understanding objects, member functions and Constructors
   - Classes with Primitive Data Members
   - Classes with Arrays as Data Members
   - Classes with Pointers as Data Members – String Class
   - Classes with Constant Data Members
   - Classes with Static Member Functions

3. Compile Time Polymorphism
   - Operator Overloading including Unary and Binary Operators
   - Function Overloading

4. Runtime Polymorphism
   - Inheritance
   - Virtual Functions
   - Virtual Base Classes
   - Templates

5. File Handling
   - Sequential Access
   - Random Access

Total: 45

EI1303 – INDUSTRIAL INSTRUMENTATION LABORATORY

(Common to EIE, ICE)

L	T	P	C
0	0	3	2

1. Measurement of flow using Venturi meter and orifice meter
2. Calibration of Pressure gauge
3. Calibration of Temperature sensor
4. Torque measurement
5. Viscosity measurement
6. Level measurement using d/p transmitter
7. UV – visible spectrophotometer
8. pH meter standardization and measurement of pH values of solutions
9. ECG analyzer
10. Measurement of pulse rate/respiration rate

Total: 45

SEMESTER VI

EC1301 – MICROPROCESSOR AND MICROCONTROLLER

(Common to EEE, EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I 8085 MICROPROCESSOR 9

8085 Architecture – Instruction set – Addressing modes – Timing diagram – Assembly language programming – Counters – Time delays – Interrupts – Memory interfacing –Interfacing I/O devices.

UNIT II PERIPHERALS INTERFACING OF 8085 9

Interfacing serial I/O (8251) – Parallel I/O (8255) – Keyboard and display controller (8279) – ADC/DAC interfacing – Inter-integrated circuits interfacing (I^2C Standard) – Bus – RS232C – RS485 – GPIB.

UNIT III 8086 MICROPROCESSOR 9

8086 architecture – 8086 addressing modes – Instruction Set – 8086 assembly language programming – Interrupts.

UNIT IV 8051 MICROCONTROLLER 9

8051 architecture – I/O pins – Ports and circuits – External memory – Counters and timers – Serial data I/O – Interrupts – Interfacing to external memory and 8255.

UNIT V 8051 PROGRAMMING AND APPLICATIONS 9

8051 instruction set – Addressing modes – Assembly language programming – I/O port programming – Timer and counter programming – Serial communication – Interrupt programming – 8051 interfacing – LCD, ADC, sensors, stepper motors, keyboard and DAC.

Total: 45

TEXT BOOKS

1. Gaonkar, R.S., “Microprocessor Architecture, Programming and Application with 8085”, 4th Edition, Prentice Hall, 2000.
2. Uffenbeck, J., “The 80 × 86 Families, Design, Programming and Interfacing”, 3rd Edition, Pearson Education, 2002.
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, 2003.

REFERENCES

1. Ray, A.K., and Burchandi, K.M., “Intel Microprocessors Architecture Programming and Interfacing”, McGraw Hill International Edition, 2000.
2. Ayala, K.J., “The 8051 Microcontroller Architecture Programming and Application”, 2nd Edition, Penram International Publishers, 1996.
3. Rafiquzzaman M., “Microprocessors Theory and Applications: Intel and Motorola”, Prentice Hall, 2003.

EI1351 – ANALYTICAL INSTRUMENTS

L	T	P	C
3	0	0	3

UNIT I COLORIMETRY AND SPECTROPHOTOMETRY 9

Special methods of analysis – Beer-Lambert law – Colorimeters – UV-Vis spectrophotometers – Single and double beam instruments – Sources and detectors – IR spectrophotometers – Types– Attenuated total reflectance flame photometers – Atomic absorption spectrophotometers – Sources and detectors – FTIR spectrophotometers – Flame emission photometers.

UNIT II CHROMATOGRAPHY 9

Different techniques – Gas chromatography – Detectors – Liquid chromatographs – Applications – High-pressure liquid chromatographs – Applications.

UNIT III INDUSTRIAL GAS ANALYZERS AND POLLUTION MONITORING INSTRUMENTS 9

Types of gas analyzers – Oxygen, NO_2 and 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.

UNIT IV pH METERS AND DISSOLVED COMPONENT ANALYZERS 9

Principle of pH measurement – Glass electrodes – Hydrogen electrodes – Reference electrodes, selective ion electrodes and ammonia electrodes – Biosensors – Dissolved oxygen analyzer – Sodium analyzer – Silicon analyzer.

UNIT V RADIO CHEMICAL AND MAGNETIC RESONANCE TECHNIQUES 9

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.

Total: 45

TEXT BOOKS

1. Khandpur, R.S., “Handbook of Analytical Instruments”, Tata McGraw Hill, 2003.
2. Willard, H.H., Merritt, L.L. Dean, J.A. and Settle, F.A., “Instrumental Methods of Analysis”, CBS Publishing and Distribution, 1995.

REFERENCES

1. Braun, R. D., “Introduction to Instrumental Analysis”, McGraw Hill, 1987.
2. Ewing, G.W., “Instrumental Methods of Analysis”, McGraw Hill, 1992.
3. Skoog, D.A. and West, D.M., “Principles of Instrumental Analysis”, Saunders Publishing, 1985.
4. Mann, C.K., Vickers, T.J. and Gullick, W.H., “Instrumental Analysis”, Harper and Row Publishers, 1974.

EI1352 – PROCESS CONTROL

(Common to EIE, ICE)

L	T	P	C
3	0	0	3

UNIT I MATHEMATICAL MODELLING OF PROCESSES 9

Need for process control – Mathematical model of first order liquid level and thermal processes – Higher order process – Process with dead time – Process with inverse response – Interacting and non-interacting systems – Continuous and batch process – Servo and regulator operation.

UNIT II CONTROLLER CHARACTERISTICS AND TUNING 9

Basic control action – Characteristics of on-off, proportional – Integral and derivative control modes – Composite control modes – P+I, P+D and P+I+D control modes – Electronic controllers to realize various control actions – Evaluation criteria – IAE, ISE, ITAE and ¼ decay ratio – Tuning of controllers – Ziegler-Nichol's method and cohencoon method – Damped oscillation method.

UNIT III CONTROL SYSTEMS WITH MULTIPLE LOOPS 9

Cascade control – Feed forward control – Ratio control – Selective control systems – Split range control – Adaptive and inferential control.

UNIT IV FINAL CONTROL ELEMENT 9

I/P converter – Pneumatic and electric actuators – Valve positioner – Control valves characteristics – Classification of control valves – Control valve sizing – Cavitations and flashing – Selection of control valves.

UNIT V SELECTED UNIT OPERATIONS 9

Mixing – Evaporation – Drying – Heat exchanger – Distillation process – Case study of control schemes of binary distillation column.

Total: 45

TEXT BOOKS

1. Donald P. Eckman, "Automatic Process Control",Wiley Eastern Ltd., 1993.
2. Stephanopoulis, G., "Chemical Process Control", Prentice Hall, 1990.

REFERENCES

1. Liptak, B.G., "Process Control", Chilton Book Company, 1994.
2. Curtis D. Johnson, "Process Control Instrumentation Technology", 7th Edition, Pearson Education / Prentice Hall of India, 2002.
3. Balchen, J.G. and Mumme, K.J., "Process Control Structures and Application", Van Nostrand Reinhold Co., 1988.

EE1353 – POWER ELECTRONICS

(Common to EEE, EIE and ICE)

L	T	P	C
3	1	0	4

UNIT I POWER SEMICONDUCTOR DEVICES 9

Power diodes – Power transistors – MOSFET and IGBT – Construction and characteristics of SCR – Turn-on and Turn-off methods – Two-transistor model – Switching performance – Triggering circuits – TRIAC – Snubber circuits – Special semiconductor devices.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse – 3-pulse and 6-pulse converters – Performance measures – Inverter operation of fully controlled converter – Effect of source impedance – Effect of load inductance

UNIT III DC TO DC CONVERTERS 9

Step-down and step-up choppers – Time ratio control and current limit control – Switching mode regulators – Buck – Boost – Buck-Boost and cuk converter – Resonant switching based SMPS.

UNIT IV INVERTERS 9

Forced commutation techniques – Single-phase and three-phase (both 120° mode and 180° mode) inverters – PWM techniques – Voltage and harmonic control – Series resonant inverter – Voltage and current source inverters.

UNIT V AC VOLTAGE CONTROLLERS 9

Principle of on-off control and phase control – Single-phase bidirectional controllers with R and RL loads – Three-phase full-wave controllers – Three-phase bidirectional delta-connected controllers – PWM control – Cycloconverters: Single-phase and Three-phase

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Muhammad H. Rashid, “Power Electronics: Circuits, Devices and Applications”, 3rd Edition, Pearson Education/Prentice Hall, 2004.
2. Singh, M.D. and Khanchandani, K.B., “Power Electronics”, 2nd Edition, Tata McGraw Hill, 2004.

REFERENCES

1. Bhimbra, P. S., “Power Electronics”, 4th Edition, Dhanpat Rai and Sons, 2000.
2. Bimal K. Bose, “Modern Power Electronics and AC Drives”, Pearson Education, 2003.
3. Ned Mohan, Tore M. Undeland, William P. Robbins, “Power Electronics Converters Applications and Design”, 3rd Edition, John Wiley and Sons, 2003.

EI1354 – FIBER OPTICS AND LASER INSTRUMENTS

L	T	P	C
3	0	0	3

UNIT I OPTICAL FIBERS AND THEIR PROPERTIES 9

Principles of light propagation through a fiber – Different types of fibers and their properties – Fiber characteristics – Absorption losses – Scattering losses – Dispersion – Connectors and splicers – Fiber termination – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBERS 9

Fiber optic sensors – Fiber optic instrumentation system – Different types of modulators – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS 9

Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers – Solid lasers – Liquid lasers – Semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS 9

Laser for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS 9

Holography – Basic principle – Methods – Helographic interferometry and application – Holography for non-destructive testing – Holographic components – Medical applications of lasers – Laser and tissue interactive – Laser instruments for surgery – Removal of tumours of vocal cards – Brain surgery – Plastic surgery – Gynaecology and oncology.

Total: 45

TEXT BOOKS

1. Senior, J.M., “Optical Fiber Communication - Principles and Practice”, Prentice Hall, 1985.
2. Wilson, J. and Hawkes, J.F.B., “Introduction to Opto Electronics”, Prentice Hall, 2001.

REFERENCES

1. Donald J. Sterling Jr, “Technicians Guide to Fiber Optics”, 3rd Edition, Vikas Publishing House, 2000.
2. Keiser, G., “Optical Fiber Communication”, McGraw Hill, 1995.
3. Gupta, S.C., “Text of Optical Fiber Communication and Applications”, Prentice Hall, 2004.

EE1354 – MODERN CONTROL SYSTEMS

(Common to EEE, EIE and ICE.)

L	T	P	C
3	1	0	4

UNIT I STATE SPACE ANALYSIS OF CONTINUOUS TIME SYSTEMS 9

State variable representation – Conversion of state variable form to transfer function and vice versa – Eigenvalues and Eigenvectors – Solution of state equation – Controllability and observability – Pole placement design – Design of state observer

UNIT II z-TRANSFORM AND SAMPLED DATA SYSTEMS 9

Sampled data theory – Sampling process – Sampling theorem – Signal reconstruction – Sample and hold circuits – z-Transform – Theorems on z-Transforms – Inverse z-Transforms – Discrete systems and solution of difference equation using z transform – Pulse transfer function – Response of sampled data system to step and ramp Inputs – Stability studies – Jury's test and bilinear transformation

UNIT III STATE SPACE ANALYSIS OF DISCRETE TIME SYSTEMS 9

State variables – Canonical forms – Digitalization – Solution of state equations – Controllability and Observability – Effect of sampling time on controllability – Pole placement by state feedback – Linear observer design – First order and second order problems

UNIT IV NONLINEAR SYSTEMS 9

Types of nonlinearity – Typical examples – Phase-plane analysis – Singular points – Limit cycles – Construction of phase trajectories – Describing function method – Basic concepts – Dead Zone – Saturation – Relay – Backlash – Liapunov stability analysis – Stability in the sense of Liapunov – Definiteness of scalar functions – Quadratic forms – Second method of Liapunov – Liapunov stability analysis of linear time invariant systems and non-linear system

UNIT V MIMO SYSTEMS 9

Models of MIMO system – Matrix representation – Transfer function representation – Poles and Zeros – Decoupling – Introduction to multivariable Nyquist plot and singular values analysis – Model predictive control

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Gopal, M., "Digital Control and State Variable Methods", 3rd Edition, Tata McGraw Hill, 2008.
2. Gopal, M., "Modern Control Engineering", New Age International, 2005.

REFERENCES

1. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", 8th Edition, Pearson Education, 2004.
2. Gopal, M., "Control Systems: Principles and Design", 2nd Edition, Tata McGraw Hill, 2003.
3. Katsuhiko Ogata, "Discrete-Time Control Systems", Pearson Education, 2002.

EC1304 – MICROPROCESSOR AND MICROCONTROLLER LABORATORY

(Common to EEE, EIE and ICE.)

L	T	P	C
0	0	3	2

1. Programs for 8/16 Bit Arithmetic Operations (Using 8085)
2. Programs for Sorting and Searching (Using 8085, 8086)
3. Programs for String Manipulation Operations (Using 8086)
4. Programs for Digital Clock and Stop Watch (Using 8086)
5. Interfacing ADC and DAC
6. Parallel Communication between Two Microprocessor Kits using Mode 1 and Mode 2 of 8255
7. Interfacing and Programming 8279, 8259, and 8253
8. Serial Communication between Two Microprocessor Kits using 8251
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control
10. Programming using Arithmetic, Logical and Bit Manipulation Instructions of 8051Microcontroller
11. Programming and Verifying Timer, Interrupts and UART Operations in 8051 Microcontroller
12. Communication between 8051 Microcontroller kit and PC

Total: 45

EI1356 – PROCESS CONTROL LABORATORY

(Common to EIE, ICE)

L	T	P	C
0	0	3	2

1. Study of interacting and non-interacting systems.
2. Response of different order processes with and without transportation lag.
3. Response of P+I+D controller.
4. Characteristics of control valve with and without positioner.
5. Closed loop response of flow control loop.
6. Closed loop response of level control loop.
7. Closed loop response of temperature control loop.
8. Closed loop response of pressure control loop.
9. Tuning of PID controller.
10. Response of cascade control system.

Total: 45

HS1301 – COMMUNICATION AND SOFT SKILLS LABORATORY

(Common to All Branches)

L	T	P	C
0	0	3	2

UNIT I LISTENING AND SPEAKING PRACTICE IN COMMUNICATIVE FUNCTIONS

Introductions and meetings – Talking about studies and/ or job – Expressing likes and dislikes – Describing daily routines and current activities – Talking about past states and events – Talking about future plans and intentions – Expressing preferences – Giving reasons – Expressing opinions, agreement and disagreement – Seeking and giving advice – Making suggestions.

UNIT II SPEAKING APPLICATIONS

Making an oral presentation – Preparing the presentation – Performing the presentation – Beginning – Language – Visual aids and body language – Voice – Ending – Questions – Telephone conversations – Group discussion and interview.

UNIT III UNDERSTANDING AND PREPARING FOR INTERNATIONAL ENGLISH LANGUAGE EXAMINATIONS

International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Business English Certificate (BEC).

UNIT IV SOFT SKILLS (1)

Preparing for and dealing with change – Motivation, goal-setting and self-esteem – Managing time and stress – Career and life planning – Team work – Leadership traits.

UNIT V SOFT SKILLS (2)

Multiple intelligences – Learning styles and personality typing – Critical and creative thinking – People, cultures and self – Intercultural communication.

REFERENCES

1. Kamalesh Sadanand, and Susheela Punitha, “Spoken English: A Foundation Course” for Speakers of Indian Languages, Part 2 Audio CD, Hyderabad: Orient Longman, 2008.
2. Malcome Goodale, “Professional Presentations”, (VCD) , Cambridge University Press, 2005.
3. Barbara Garside, Tony Garside, “Essential Telephoning in English” (Audio CD), Cambridge, Cambridge University Press, 2002.
4. Hari Mohan Prasad, Rajnish Mohan, “How to Prepare for Group Discussion and Interview” (Audio Cassette) Tata McGraw-Hill Publishing.
5. “International English Language Testing System Practice Tests”, CUP.
6. “Business English Certificate Materials”, Cambridge University Press.
7. “Understanding the TOEFL”, Educational Testing Services, Princeton, US.
8. Interactive Multimedia Programs on Managing Time and Stress.
9. Robert M. Sherfield, “Developing Soft Skills” : Pearson Education, 4th Edition, 2009.

List of activities that are to be carried out: (15 sessions x 3 periods = 45)

Lab session # 1: Listening and speaking practice exercises with communicative functions. Learning material: the ACD of Spoken English: A Foundation Course for Speakers of Indian Languages (Orient Longman, 2008)

Lab session # 2: Practice with more advanced communicative functions. Learning material: the ACD of Spoken English: A Foundation Course for Speakers of Indian Languages (Orient Longman, 2008)

Lab session # 3: Pronunciation exercises with Oxford Advanced Learners' Dictionary of Current English or any other standard Dictionary

Lab session # 4: Making an oral presentation in English. Learning Material: Professional Presentations VCD (Cambridge University Press)

Lab session # 5: Listening to telephone conversations in English and completing the tasks. Learning material: Essential Telephoning in English ACD (Cambridge University Press)

Lab session # 6: Giving an exposure to and practice with model group discussion and interviews. Learning material: How to Prepare for Group Discussion and Interview Audio Cassette (McGraw-Hill)

Lab session # 7: Giving insights into the format and the task types in the IELTS (International English Language Testing System). Learning Material: Objective IELTS, Intermediate Level (CUP)

Lab session # 8: Understanding the format and the task types in the TOEFL (Test of English as a Foreign Language). Learning Material: Understanding the TOEFL (Educational Testing Services, Princeton)

Lab session # 9: Administering the BEC (Business English Certificate) Diagnostic Test. Learning Material: BEC Practice Materials (British Council, Chennai)

Lab session # 10: Completing the steps involved in Career, Life Planning and Change Management. Learning Material: Developing Soft Skills (Pearson Education)

Lab session # 11: Setting goals and objectives exercises. Learning Material: Developing Soft Skills (Pearson Education)

Lab session # 12: Prioritizing and time planning exercises. Learning Material: Managing Time Multimedia Program CD

Lab session # 13: Taking a Personality Typing/ Psychometric Test Learning Material: 200 Psychometric Test prepared by the CUIC, Anna University Chennai

Lab session # 14: Critical and creative thinking exercises.

Lab session # 15: Improving body language and cross-cultural communication with pictures. Learning material: Body Language (S. Chand and Co.)

EI1401 – COMPUTER CONTROL OF PROCESS

(Common to EIE and ICE)

L	T	P	C
3	1	0	4

UNIT I ANALYSIS OF DISCRETE DATA SYSTEM 9

State-space representation of discrete time systems – Selection of sampling process – Selection of sampling period – Review of z-transform – Pulse transfer function – Modified z-transform – Stability of discrete data system – Jury's stability test and Bilinear transformation

UNIT II DESIGN OF DIGITAL CONTROLLER 9

Digital PID control– Position and velocity form – Deadbeat's algorithm – Dahlin's algorithm – Kalman's algorithm – Pole placement controller – Predictive controller

UNIT III COMPUTER AS A CONTROLLER 9

Basic building blocks of computer control system – Data acquisition systems – SCADA – Direct digital control – Introduction to AI and expert control system – Case study – Design of computerized multi-loop controller

UNIT IV PROGRAMMABLE LOGIC CONTROLLER 9

Evolution of PLC's – Components of PLC – Advantages over relay logic – PLC programming languages – Ladder diagram – Programming timers and counters – Design of PLC

UNIT V APPLICATIONS OF PLC 9

PLC Instructions – Program control instructions, math instructions – Sequencer instructions – Use of PC as PLC – Application of PLC – Case study of bottle filling system.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Deshpande, P.B. and Ash, R.H., "Computer Process Control", ISA Publication, 1995.
2. Petruzella, "Programmable Controllers", McGraw-Hill, 1989.

REFERENCES

1. Houpis, C.M. Lamount, G.B., "Digital Control Systems Theory, Hardware and Software", International Student Edition, McGraw-Hill, 1985.
2. Stephanoupoulis, G., "Chemical Process Control", Prentice Hall of India, 1990.
3. Hughes, T.A., "Programmable Controllers", 4th Edition, ISA Press, 2005.
4. Singh, S.K., "Computer Aided Process Control", Prentice Hall of India, 2004.

IC1401 – VIRTUAL INSTRUMENTATION

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I REVIEW OF DIGITAL INSTRUMENTATION 9

Representation of analog signals in the digital domain – Review of quantization in amplitude and time – Sample and hold –Sampling theorem – ADC and DAC

UNIT II FUNDAMENTALS OF VIRTUAL INSTRUMENTATION (VI) 9

Concept of virtual instrumentation – PC based data acquisition – Typical on board DAQ card – Resolution and sampling frequency – Multiplexing of analog inputs – Single-ended and differential inputs – Different strategies for sampling of multi-channel analog inputs – Concept of universal DAQ card – Use of timer-counter and analog outputs on the universal DAQ card

UNIT III CLUSTER OF INSTRUMENTS IN VI SYSTEM 9

Interfacing of external instruments to a PC – RS232 – RS 422 – RS 485 – USB standards – IEEE 488 standard – ISO-OSI model for serial bus – Introduction to bus protocols of MOD bus and CAN bus

UNIT IV GRAPHICAL PROGRAMMING ENVIRONMENT IN VI 9

Concepts of graphical programming – Lab-view software – Concept of VIs and sub VI – Display types – Digital – Analog – Chart – Oscilloscopic types – Loops – Case and sequence structures – Types of data – Arrays – Formulae nodes – Local and global variables – String and file I/O

UNIT V ANALYSIS TOOLS AND SIMPLE APPLICATIONS IN VI 9

Fourier transform – Power spectrum – Correlation – Windowing and filtering tools – Simple temperature indicator – ON/OFF controller – PID controller – CRO emulation – Simulation of a simple second order system – Generation of HTML page

Total: 45

TEXT BOOKS

1. Gupta, S. and Gupta, J.P., “PC Interfacing for Data Acquisition and Process Control”, Instrument society of America, 1994.
2. Peter W. Gofton, “Understanding Serial Communications”, Sybex International, 1994.
3. Robert H. Bishop, “Learning with Lab-view”, Prentice Hall of India, 2003.

REFERENCES

1. Kevin James, “PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control”, Newnes, 2000.
2. Gary W. Johnson, Richard Jennings, “Lab-view Graphical Programming”, McGraw-Hill Professional Publishing, 2001.

EC1357 – VLSI DESIGN

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I MOS TRANSISTOR THEORY AND PROCESS TECHNOLOGY 9

NMOS and PMOS transistors – Threshold voltage – Body effect – Design equations– Second order effects – MOS models – Small signal AC characteristics – Basic CMOS technology

UNIT II INVERTERS AND LOGIC GATES 9

NMOS and CMOS Inverters – Stick diagram – Inverter ratio – DC and transient characteristics – Switching times – Super buffers – Driving large Capacitance loads – CMOS logic structures – Transmission gates – Static CMOS design – Dynamic CMOS design

UNIT III CIRCUIT CHARACTERISATION AND PERFORMANCE ESTIMATION9

Resistance estimation – Capacitance estimation – Inductance – Switching characteristics – Transistor sizing – Power dissipation and design margining – Charge sharing – Scaling

UNIT IV VLSI SYSTEM COMPONENTS CIRCUITS AND SYSTEM LEVEL PHYSICAL DESIGN 9

Multiplexers – Decoders – Comparators – Priority Encoders – Shift Registers – Arithmetic Circuits – Ripple Carry Adders – Carry Look Ahead Adders – High-Speed Adders –Multipliers – Physical design – Delay modeling – Cross Talk – Floor planning – Power distribution – Clock distribution – Basics of CMOS testing

UNIT V FPGA and VERILOG HARDWARE DESCRIPTION LANGUAGE 9

Introduction to FPGA – Xilinx FPGA – Xilinx 2000 – Xilinx 3000 – Overview of Digital Design with Verilog HDL – Hierarchical modeling concepts – Modules and Port definitions – Gate level modeling – Data flow modeling – Behavioral modeling

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Neil, H. E. Weste and Kamran Eshraghian, “Principles of CMOS VLSI Design”, 2nd Edition, Pearson Education Asia, 2000.
2. John P. Uyemura “Introduction to VLSI Circuits and Systems”, John Wiley and Sons, Inc., 2002.
3. Samir Palnitkar, “Verilog HDL”, 2nd Edition, Pearson Education, 2004.

REFERENCES

1. Eugene D. Fabricius, “Introduction to VLSI Design”, McGraw Hill International Editions, 1990.
2. Bhasker, J., “A Verilog HDL Primer”, 2nd Edition, B. S. Publications, 2001.
3. Pucknell, “Basic VLSI Design”, Prentice Hall of India, 1995
4. Wayne Wolf, “Modern VLSI Design System on Chip”, Pearson Education, 2002

MG1402 – OPERATIONS RESEARCH

(Common to EEE, EIE and ICE)

L	T	P	C
3	1	0	4

UNIT I LINEAR PROGRAMMING (LP) 9

Basic concepts and scope of OR – Phases of OR – Formulation of LP Problems – Limitations of LP – Solutions to LPP – Graphical Solution – Standard LP form and its Basic solutions – The simplex algorithm – Artificial Variable Technique – Big-M method, Two-phase method – Variants of the Simplex Method – Degeneracy, unbounded solution, infeasible solution – Application for business and Industrial problems

UNIT II DUALITY, TRANSPORTATION MODEL AND ASSIGNMENT MODEL 9

Primal – Dual models – Dual simplex method – Mathematical formulation of the problem – Methods for finding an initial solution – North-West corner method, Least-cost method, Vogel's Approximation Method (VAM) – Test for optimality – Variants of the transportation problem – Mathematical Formulation of the problem – Solution of an assignment problem – Hungarian algorithm – Variants of the assignment problem – Traveling salesman problem

UNIT III INTEGER DYNAMIC PROGRAMMING 9

Types – Concept of a cutting plane – Gomory's cutting plane method – Branch and bound method – Concepts – Terminology – Bellman's principle of optimality – Application in Network, allocation and inventory

UNIT IV PROJECT MANAGEMENT AND THEORY OF GAMES 9

Concept of Network – PERT, CPM – Construction of Network – Critical path analysis – Probability in PERT analysis – Cost trade-off analysis – Two-person zero-sum game – Pure strategies – Mixed strategies – Games with dominance – Solution methods of games without saddle point – Algebraic method, arithmetic method, matrix method and Graphical method

UNIT V INVENTORY CONTROL AND QUEUING 9

Deterministic model – Costs – Decision variables – EOQ – Instantaneous receipt of goods with and without shortages – Non-instantaneous receipt of goods without shortages – Price breaks – Probabilistic inventory model – Single period without setup cost – Inventory systems – Lead time – Safety stock – ROL, ROP determination – Characteristics of Queuing system – Symbols and Kendall's notation – Poisson arrival and exponential service – Single and multi channel model – Infinite population

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Sharma, J.K., "Operations Research: Theory and Applications", Macmillan India Ltd., Reprint, 2003.
2. Hamdy A. Taha, "Operations Research – An Introduction", 7th Edition, Prentice Hall of India, 2002.

REFERENCES

1. Don T. Philips, Ravindran A. and James Solnerg, "Operations Research: Principles and Practice", John Wiley and Sons, 1986.
2. Bobby Srinivasan and Sandblom, C.L., "Quantitative Analysis for Business Decisions", Tata McGraw Hill Edition, 1989.
3. Chandrasekara Rao, Shanti Lata Misra, "Operations Research", Alpha Science International Ltd, 2005.
4. Nita H. Shah, Ravi M. Gor, Hardik Soni, "Operations Research", Prentice Hall of India, 2007.

EC1359 – VLSI DESIGN LABORATORY

(Common to EIE and ICE.)

L	T	P	C
0	0	3	2

1. Study of Simulation Using Tools
2. Study of Synthesis Tools
3. Place and Root and Back Annotation for FPGAs
4. Study of Development Tool for FPGA for Schematic Entry and Verilog
5. Design of Traffic Light Controller Using Verilog and Above Tools
6. Design and Simulation of Pipelined Serial and Parallel Adder to Add/Subract 8 Bit Number of Size, 12 Bits Each in 2's Complement
7. Design and Simulation of Back Annotated Verilog Files for Multiplying Two Signed, 8 Bit Numbers in 2's Complement. Design must be Pipelined and Completely RTL Compliant
8. Study of FPGA Board and Testing on Board LEDs and Switches Using Verilog Codes
9. Testing the Traffic Controller Design Developed in SI. NO.5 on the FPGA Board
10. Design a Realtime Clock (2 Digits, 7 Segments LED Displays Each for HRS., MTS, And SECS.) and demonstrate its Working on the FPGA Board (An Expansion Card is Required for the Displays)

Total: 45

EI1402 – COMPUTER CONTROL OF PROCESS AND VIRTUAL INSTRUMENTATION LABORATORY

(Common to EIE and ICE)

L	T	P	C
0	0	3	2

1. Simulation of first order system and second order with and without dead time using discretization method and Runge-Kutta method
2. Design of Discrete PID controller for a first order system
3. Study of Programmable logic controller.
4. Control of Bottle filling system using PLC.
5. Simulation of complex control systems using matlab package.
6. Operation of computer controlled liquid level system.
7. Operation of computer controlled thermal system.
8. Study of distributed control system.
9. Data Acquisition using Virtual Instrumentation from Temperature transducer.
10. Creation of a CRO using Virtual Instrumentation
11. Creation of a Digital Multi-meter using Virtual Instrumentation.
12. Design Variable Function Generator Using Virtual Instrumentation.

Total: 45

SEMESTER VIII

CS1452 – NEURAL NETWORK AND FUZZY LOGIC CONTROL

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I NEURAL NETWORKS AND PATTERN ASSOCIATION 9

Differences between biological and artificial neural networks – Typical architecture – Common activation functions – McCulloch – Pitts neuron – Simple neural nets for pattern classification – Linear separability – Hebb net – Perceptron – Adaline – Madaline – Architecture – Algorithm and simple applications – Training algorithms for pattern association – Hebb rule and delta rule – Hetero associative – Auto associative and iterative auto associative net – Bidirectional associative memory – Architecture – Algorithm – Simple applications

UNIT II NEURAL NETWROKS BASED ON COMPETITION 9

Kohonen self organising maps – Learning vector quantization – Counter propagation – Architecture – Algorithm and applications

UNIT III ADAPTIVE RESONANCE AND BACKPROPAGATION NEURAL NETWORKS 9

ART1 and ART2 – Basic operation and algorithm – Standard back propagation architecture – Derivation of learning rules – Boltzmann machine learning – Architecture – Algorithm and simple applications

UNIT IV FUZZY SETS AND MEMBERSHIP FUNCTIONS 9

Properties and operations on classical and fuzzy sets – Crisp and fuzzy relations – Cardinality – properties and operations – Composition – Tolerance and equivalence relations – Simple problems – Features of membership function – Standard forms and boundaries – Fuzzification – Membership value assignments – Fuzzy to crisp conversions – Lambda cuts for fuzzy sets and relations – De-fuzzification methods

UNIT V APPLICATIONS OF NEURAL NETWORKS AND FUZZY LOGIC 9

Applications of neural networks – Pattern recognition – Image compression – Communication – Control systems – Applications of fuzzy logic – Fuzzy pattern recognition – Fuzzy image compression – Fuzzy logic controllers

Total: 45

TEXT BOOKS

1. Sivanandam, S.N., Sumathi, S. and Deepa, S.N., "Introduction to Neural Networks Using Matlab 6.0", Tata McGraw-Hill, 2005.
2. Laurene Fausett, "Fundamentals of Neural Networks", Pearson Education, 2004.
3. Timothy Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1998.

REFERENCES

1. Zimmermann, H.J., "Fuzzy Set Theory and Its Applications", Allied Publishers Ltd, 1999
2. Klir, G.J, Folger, T., "Fuzzy Sets, Uncertainty and Information", 5th Indian reprint, Prentice Hall of India, 2002.
3. Zurada, J.M., "Introduction to Artificial Neural Systems", Jaico Publishing House, 2006.
4. Mohammad H. Hassoun, "Fundamentals of Neural Networks", Prentice Hall of India, 2002.
5. Bark Kosko "Neural Networks and Fuzzy Systems" Prentice Hall of India, 1994.

EI1451 – DISTRIBUTED CONTROL SYSTEM

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I DATA NETWORK FUNDAMENTALS 9

Network hierarchy and switching – Open system interconnection model of ISO – Data link control protocol – BISYNC – SLDC – HLDC – Media access protocol – Command – Token passing – CSMA/CD, TCP/IP

UNIT II INTERNET WORKING 9

Bridges –Routers – Gateways – Open system with bridge configuration – Open system with gateway configuration – Standard ETHERNET and ARCNET configuration – Special requirement for networks used for control

UNIT III DISTRIBUTED CONTROL SYSTEM 9

Evolution – Architectures – Comparison – Local control unit – Process interfacing issues – Communication facilities

UNIT IV INTERFACES IN DCS 9

Operator interfaces – Low level and high level operator interfaces – Operator displays – Engineering interfaces – Low level and high level engineering interfaces – General purpose computers in DCS

UNIT V HART AND FIELD BUS 9

Evolution of signal standards – HART communication protocol – Communication modes – HART networks – Control system interface – HART and OSI model – Field bus introduction – General field bus architecture – Basic requirements of field bus standard – Field bus topology – Inter operability

Total: 45

TEXT BOOKS

1. Tanenbaum, A.S., “Computer Networks”, 3rd Edition, Pearson Education / Prentice Hall of India, 1996.
2. Michael P. Lukas, “Distributed Control System”, Van Nostrand Reinhold Co., 1986.

REFERENCES

1. McMillan, G.K., “Process/Industrial Instruments and Controls Hand book”, Tata McGraw-Hill, 1999.
2. Romily Bowden, “HART application Guide and OSI Communication Foundation”, 1999.
3. Buchanan, W., “Computer Buses”, Arnold Publishers, 2000.

ELECTIVE I

CS1029 – ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

(Common to EEE, EIE and ICE)

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UNIT I ARTIFICIAL INTELLIGENCE 9

AI – Intelligent agents – Perception – Natural language processing – Problem – Solving agents – Searching for solutions – Uniformed search strategies – Informed search strategies

UNIT II KNOWLEDGE AND REASONING 9

Adversarial search – Optimal and imperfect decisions – Alpha, Beta pruning – Logical agents – Propositional logic – First order logic – Syntax and semantics – Using first order logic – Inference in first order logic

UNIT III UNCERTAIN KNOWLEDGE AND REASONING 9

Uncertainty – Acting under uncertainty – Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning – Making simple decisions

UNIT IV PLANNING AND LEARNING 9

Planning – Planning problem – Partial order planning – Planning and acting in non-deterministic domains – Learning decision trees – Knowledge in learning – Neural networks – Reinforcement learning – Passive and active

UNIT V EXPERT SYSTEMS 9

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge representation in expert systems – Expert system tools – MYCIN – EMYCIN

Total: 45

TEXT BOOKS

1. Stuart Russel and Peter Norvig, "Artificial Intelligence a Modern Approach", 2nd Edition, Prentice Hall of India, 2003.
2. Donald A.Waterman, "A Guide to Expert Systems", Pearson Education, 2003.

REFERENCES

1. George F. Luger, "Artificial Intelligence – Structures and Strategies for Complex Problem Solving", 4th Edition, Pearson Education, 2002.
2. Elain Rich, Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 1995.
3. Janakiraman, Sarukesi, K., "Foundations of Artificial Intelligence and Expert Systems", Macmillan Series in Computer Science, 2001.
4. Patterson, W., "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 2003.

ME1016 – MECHATRONICS

(Common to EIE and ICE)

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UNIT I INTRODUCTION **9**

Mechatronics – Definition and key issues – Evolution – Elements – Mechatronics approach to modern engineering design

UNIT II SENSORS AND TRANSDUCERS **9**

Types – Displacement – Position – Proximity and velocity sensors – Signal processing – Data display

UNIT III ACTUATION SYSTEMS **9**

Mechanical types – Applications – Electrical types – Applications – Pneumatic and hydraulic systems – Applications – Selection of actuators

UNIT IV CONTROL SYSTEMS **9**

Types of controllers – Programmable logic controllers – Applications – Ladder diagrams – Microprocessor applications in mechatronics – Programming interfacing – Computer applications

UNIT V RECENT ADVANCES **9**

Manufacturing mechatronics – Automobile mechatronics – Automobile mechatronics – Medical mechatronics – Office automation – Case studies

Total: 45

TEXT BOOKS

1. Bulton, N., "Mechatronics Electronic Control system for Mechanical and Electrical Engineering", Longman, 1995.
2. Dradly, D.A., Dawson, D., Burd, N.C. and Loader, A.J., "Mechatronics: Electronics in Products and Processes", Chapman and Hall, 1993.

REFERENCES

1. HMT, "Mechatronics", Tata McGraw-Hill, 1968.
2. Galip Ulsoy A. and Devires W.R., "Microcomputer Applications in Manufacturing", John wiley, 1989.
3. James Harter, "Electromechanics: Principles, Concepts and Devices", Prentice Hall, 1995.

CS1358 – COMPUTER ARCHITECTURE

(Common to EEE, EIE and ICE)

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UNIT I BASIC STRUCTURE OF COMPUTERS 10

Functional units – Basic operational concepts, bus structures, software performance –Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT II ARITHMETIC 8

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers – Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

UNIT III BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control consideration – Superscalar operation.

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM, ROM – Speed, size and cost – Cache memories – Performance consideration – Virtual memory – Memory management requirements –Secondary storage.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O interfaces (PCI, SCSI, and USB).

Total: 45

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky., “Computer Organization” 5th Edition, TMH, 2002.

REFERENCES

1. William Stallings, “Computer Organization & Architecture –Designing for Performance”, 6th Edition, Pearson Education, 2003 reprint.
2. David A. Patterson and John L. Hennessy, “Computer Organization & Design, the hardware / software interface”, 2nd Edition, Morgan Kaufmann, 2002 reprint.
3. John P. Hayes, “Computer Architecture & Organization”, 3rd Edition, TMH, 1998.

GE1301 – PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to EEE, EIE and ICE)

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UNIT I HUMAN VALUES 9

Morals, values and ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Co-operation – Commitment – Empathy – Self-confidence – Character – Spirituality

UNIT II ENGINEERING ETHICS 9

Senses of Engineering Ethics – Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy – Kohlberg's theory – Gilligan's theory – Consensus and controversy – Models of professional roles – Theories about right action – Self-interest – Customs and religion – Uses of ethical theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation – Engineers as responsible experimenters – Codes of ethics – A balanced outlook on law – The challenger case study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk – The three mile island and Chernobyl case studies – Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 9

Multinational corporations – Environmental ethics – Computer ethics – Weapons development – Engineers as Managers – Consulting Engineers – Engineers as expert witnesses and advisors – Moral leadership – Sample code of ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers(IETE), India, etc.

Total: 45

TEXT BOOKS

1. Mike Martin, Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, 1996.
2. Govindarajan, M., Natarajan, S. and Senthil Kumar V.S., “Engineering Ethics”, Prentice Hall of India, 2004.

REFERENCES

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, 2004.
2. Charles E. Harris, Michael S. Protchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, 2000.
3. John R. Boatright, “Ethics and the Conduct of Business”, Pearson Education, 2003.
4. Edmund G. Seebauer and Robert L. Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, 2001.

EI1001 – POWER PLANT INSTRUMENTATION

(Common to EIE and ICE)

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UNIT I OVERVIEW OF POWER GENERATION 9

Brief survey of methods of power generation – Hydro power – Thermal power – Nuclear power-solar and wind power – Importance of instrumentation in power generation – Thermal power plants – Block diagram – Details of boiler processes – UPand I diagram of boiler – Cogeneration

UNIT II MEASUREMENTS IN POWER PLANTS 9

Electrical measurements – Current – Voltage – Power – Frequency – Power factor etc. – Non electrical parameters – Flow of feed water – Fuel – Air and steam with correction factor for temperature – Steam pressure and steam temperature – Drum level measurement – Radiation detector – Smoke density measurement – Dust monitor

UNIT III ANALYSERS IN POWER PLANTS 9

Flue gas oxygen analyzer – Analysis of impurities in feed water and steam – Dissolved oxygen analyzer – Chromatography – pH meter – Fuel analyzer – Pollution monitoring instruments

UNIT IV CONTROL LOOPS IN BOILER 9

Combustion control – Air/fuel ratio control – Furnace draft control – Drum level control – Main steam and reheat steam temperature control – Super heater control – Air temperature – Deaerator control – Distributed control system in power plants – Interlocks in boiler operation

UNIT V TURBINE – MONITORING AND CONTROL 9

Speed, vibration, shell temperature monitoring and control – Steam pressure control – Lubricant oil temperature control – Cooling system

Total: 45

TEXT BOOKS

1. Sam G. Dukelow, “The Control of Boilers”, Instrument Society of America, 1991.
2. Nag, P.K., “Power Plant Engineering”, Tata McGraw-Hill, 2001.

REFERENCES

1. Elonka, S.M. and Kohal, A.L., “Standard Boiler Operations”, Tata McGraw-Hill, 1994.
2. Jain, R.K., “Mechanical and Industrial Measurements”, Khanna Publishers, 1995.
3. Wakil, E.Al., “Power Plant Engineering”, Tata McGraw-Hill, 1984.

ELECTIVE II

IC1001 – ADAPTIVE CONTROL

(Common to EEE, EIE and ICE)

L	T	P	C
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UNIT I INTRODUCTION 9

Introduction to adaptive control – Effects of process variations – Adaptive control schemes – Adaptive control problem – Non-parametric identification – Step response method – Impulse response method – Frequency response method

UNIT II PARAMETRIC IDENTIFICATION 9

Linear in parameter models – ARX – ARMAX – ARIMAX – Least square estimation – Recursive least square estimation – Extended least square estimation – Maximum likelihood estimation – Introduction to non-linear systems identification – Pseudo random binary sequence

UNIT III SELF-TUNING REGULATOR 9

Deterministic in-direct self-tuning regulators – Deterministic direct self-tuning regulators – Introduction to stochastic self-tuning regulators – Stochastic indirect self-tuning regulator

UNIT IV MODEL REFERENCE ADAPTIVE CONTROLLER 9

The MIT rule – Lyapunov theory – Design of model reference adaptive controller using MIT rule and Lyapunov theory – Relation between model reference adaptive controller and self-tuning regulator

UNIT V TUNING OF CONTROLLERS AND CASE STUDIES 9

Design of gain scheduling controller – Auto-tuning of PID regulator – Stability analysis of adaptive controllers – Application of adaptive control in chemical reactor, distillation column and variable area tank system

Total: 45

TEXT BOOK

1. Karl J. Astrom and Bjorn Wittenmark, “Adaptive Control”, 2nd Edition, Pearson Education, 2003.

REFERENCES

1. Hsia, T.C.H.A., “System Identification”, Lexington Books, 1974.
2. Stephanopoulis, G., “Chemical Process Control”, Prentice Hall of India, 1990.

CS1034 – VISUAL LANGUAGES AND APPLICATIONS

(Common to EIE and ICE.)

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UNIT I FUNDAMENTALS OF WINDOWS AND MFC 9

Messages – Windows programming – SDK style – Hungarian notation and windows data types – SDK programming in perspective – The benefits of C++ and MFC – MFC design philosophy – Document / View architecture – MFC class hierarchy – AFX functions. Application object – Frame window object – Message map – Drawing the lines – Curves – Ellipse – Polygons and other shapes – GDI pens – Brushes – GDI fonts – Deleting GDI objects and deselecting GDI objects – Getting input from the mouse: Client and Non-client – Area mouse messages – Mouse wheel – Cursor – Getting input from the keyboard – Input focus – Keystroke messages – Virtual key codes – Character and dead key messages

UNIT II RESOURCES AND CONTROLS 9

Creating a menu – Loading and displaying a menu – Responding to menu commands – Command ranges – Updating the items in menu – update ranges – Keyboard accelerators – Creating menus programmatically – Modifying menus programmatically – The system menu – Owner draw menus – Cascading menus – Context menus – The C button class – C list box class – C static class – The font view application – C edit class – C combo box class – C scrollbar class – Model dialog boxes – Modeless dialog boxes

UNIT III DOCUMENT / VIEW ARCHITECTURE 9

The inexistence function revisited – Document object – View object – Frame window object – Dynamic object creation. SDI document template – Command routing – Synchronizing multiple views of a document – Mid squares application – Supporting multiple document types – Alternatives to MDI – Splitter Windows: Dynamic splitter window – Static splitter windows – Creating and initializing a toolbar – Controlling the toolbar's visibility – Creating and initializing a status bar – Creating custom status bar panes – Status bar support in appwizard – Opening – closing and creating the files – Reading and Writing – C file derivatives – Serialization basics – Writing serializable classes

UNIT IV FUNDAMENTALS OF VISUAL BASIC 9

Menu bar – Tool bar – Project explorer – Toolbox – Properties window – Form designer – Form layout – Intermediate window – Designing the user interface – Aligning the controls – Running the application – Visual development and event driven programming – Variables – Declaration – Types – Converting variable types – User defined data types – Lifetime of a variable – Constants – Arrays – Types of arrays – Procedures – Subroutines – Functions – Calling procedures. Text box controls – List box and combo box controls – Scroll bar and slider controls – File controls

UNIT V DATABASE PROGRAMMING WITH VB 9

Record sets – Data control – Data control properties – Methods – Visual data manager – Specifying indices with the visual data manager – Entering data with the visual data manager – Data bound list control – Data bound combo box – Data bound grid control – Mapping databases – Database object – Table DEF object – Query def object – Programming the active database objects – ADO object model – Establishing a connection – Executing SQL statements – Cursor types and locking mechanism – Manipulating the record set object – Simple record editing and updating

Total: 45

TEXT BOOKS

1. Jeff Prosise, “Programming Windows With MFC”, 2nd Edition, WP Publishers and Distributors [P] Ltd, Reprinted 2002.
2. Evangelos Petroutsos, “Mastering Visual Basic 6.0”, BPB Publications, 2002.

REFENENCES

1. Herbert Schildt, “MFC Programming from the Ground Up”, 2nd Edition, Tata McGraw Hill, 2002.
2. John Paul Muller, “Visual C++ 6 From the Ground Up 2nd Edition”, Tata McGraw Hill, 2002.
3. Curtis Smith and Micheal Amundsen, “Teach Yourself Database Programming with Visual Basic 6 in 21 days”, Techmedia Pub, 1999.

EI1002 – AIRCRAFT INSTRUMENTATION

(Common to EIE and ICE)

L	T	P	C
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UNIT I INTRODUTION **9**

Classification of aircraft instrumentation – Instrument display – Panels – Cockpit layout

UNIT II FLIGHT INSTRUMENTATION **9**

Static and pilot pressure source – Altimeter – Airspeed indicator – Vertical speed indicator – Machmeter – Maximum safe speed indicator – Accelerometer

UNIT III GYROSCOPIC INSTRUMENTS **9**

Gyroscopic theory – Directional gyro indicator – Artificial horizon – Turn and slip indicator

UNIT IV AIRCRAFT COMPUTER SYSTEMS **9**

Terrestrial magnetism – Aircraft magnetism – Direct reading magnetic compass – Compass errors – Gyro-magnetic compass

UNIT V POWER PLANT INSTRUMENTS **9**

Fuel flow – Fuel quantity measurement – Exhaust gas temperature measurement – Pressure measurement

Total: 45

REFERENCES

1. Pallet, E.H.J., “Aircraft Instruments –Principles and application”, Pitman and sons, 1981.
2. Pallet, E.H.J., “Aircraft Instrument and Integrated Systems”, Pitman and sons, 1991.

EI1003 – INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES

(Common to ICE and EIE)

L	T	P	C
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UNIT I PETROLEUM PROCESSING 9

Petroleum exploration – Recovery techniques – Oil-Gas separation – Processing wet gases – Refining of crude oil

UNIT II OPERATIONS IN PETROLEUM INDUSTRY 9

Thermal cracking – Catalytic cracking – Catalytic reforming – Polymerisation – Alkylation – Isomerization – Production of ethylene, acetylene and propylene from petroleum

UNIT III CHEMICALS FROM PETROLEUM PRODUCTS 9

Chemicals from petroleum – Methane derivatives – Acetylene derivatives – Ethylene derivatives – Propylene derivatives – Other products

UNIT IV MEASUREMENTS IN PETROCHEMICAL INDUSTRY 9

Parameters to be measured in refinery and petrochemical industry – Selection and maintenance of measuring instruments – Intrinsic safety of Instruments

UNIT V CONTROL LOOPS IN PETROCHEMICAL INDUSTRY 9

Process control in refinery and petrochemical industry – Control of distillation column – Control of catalytic crackers and pyrolysis unit – Automatic control of polyethylene production – Control of vinyl chloride and PVC production

Total: 45

TEXT BOOKS

1. Waddams, A.L., “Chemicals from Petroleum”, Butter and Janner Ltd., 1968.
2. Balchan, J.G. and Mumme, K.I., “Process Control Structures and Applications”, Van Nostrand Reinhold Company, 1988.

REFERENCES

1. Austin G.T. Shreeves, “Chemical Process Industries”, McGraw Hill International Student Edition,1985.
2. Liptak, B.G., “Instrumentation in Process Industries”, Chilton Book Company, 1994.

EC1020 – EMBEDDED SYSTEM DESIGN

(Common to EEE and EIE)

L	T	P	C
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UNIT I EMBEDDED COMPUTING 9

Basic concepts in embedded systems – Complex systems and Microprocessor – Embedded system design process – Formalisms for system design – Instruction sets – ARM processor – SHARC Processor

UNIT II EMBEDDED COMPUTING PLATFORM 9

CPU – Programming input and output – Supervisor mode, exception and traps – Coprocessor – Memory system mechanisms – CPU performance – CPU power consumption – The CPU bus – Memory devices – I/O devices – Component interfacing – Designing with microprocessor – Development and debugging

UNIT III PROGRAMMING DESIGN AND ANALYSIS 9

Program design – Models of program – Assembly and linking – Basic compilation techniques – Analysis and optimization of execution time – Analysis and optimization of energy, power and program size – Program validation and testing

UNIT IV PROCESSES AND OPERATING SYSTEMS 9

Introduction – Multiple task and multiple processes – Context switching – Operating systems – Scheduling policies – Interprocess communication mechanisms – Evaluation of operating system performance – Power optimization strategies for processes

UNIT V HARDWARE ACCELERATORS AND NETWORKS 9

CPUs and Accelerators – Accelerated system design – Distributed embedded architecture S-networks for embedded systems – Network based design – Internet enabled systems – System design techniques

Total: 45

TEXT BOOK

1. Wayne Wolf, “Computer as Components: Principles of Embedded Computing System Design”, 2nd Edition, Morgan Kaufmann Publishers, 2008.

REFERENCES

1. Arnold S.Berger, “Embedded Systems Design An Introduction to Processes, Tools and Techniques” – CMP Eswar Publication, 2002.
2. David E. Simon, “An Embedded Software Primer”, Pearson India Limited, 1999.

ELECTIVE III

CS1031 – OPERATING SYSTEMS

(Common to EIE and ICE)

L	T	P	C
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UNIT I FUNDAMENTALS **9**

Concepts – Mainframe systems – Desktop systems – Multiprocessor systems – Distributed systems – Clustered systems – Real time systems – Handheld systems – Hardware protection – System components – Operating system services – System calls – System programs

UNIT II PROCESS MANAGEMENT **9**

Process concept – Process scheduling – Operations on processes – Cooperating processes – Inter process communication – Threads – Overview – Threading issues – CPU scheduling – Basic concepts – Scheduling criteria – Scheduling algorithms – Multiple processor scheduling – Real time scheduling – The critical section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors

UNIT III DEADLOCKS **9**

System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlocks

UNIT IV MEMORY AND FILE MANAGEMENT **9**

Storage management – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging – Virtual memory – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing – File concept – Access methods – Directory structure – File system mounting – File sharing – Protection

UNIT V FILE AND I/O SYSTEMS **9**

File system structure – File system implementation – Directory implementation – Allocation methods – Free – Space management – Kernel I/O subsystems – Disk structure – Disk scheduling – Disk management – Swap-Space management – Case Study – The Linux system – Windows

Total: 45

TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 6th Edition, John Wiley and Sons, 2003.
2. Harvey M. Deitel, “Operating Systems”, 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India, 2003.
2. William Stallings, “Operating System”, 4th Edition, Prentice Hall of India, 2003.

IC1004 – ROBOTICS AND AUTOMATION

(Common to EIE and ICE)

L	T	P	C
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UNIT I INTRODUCTION TO ROBOTICS 9

History of Robots – Classifications – Various fields of Robotics – Actuators – Sensors – Manipulators – End effectors – Application areas – Robot programming languages

UNIT II ROBOT KINEMATICS 9

Matrix representation – Homogeneous transformation – DH representation of standard robots – Inverse kinematics

UNIT III ROBOT DYNAMICS 9

Velocity kinematics – Jacobian and inverse Jacobian – Lagrangian formulation – Eulers Lagrangian formulation – Robot equation of motion

UNIT IV TRAJECTORY PLANNING 9

Introduction – Path Vs trajectory – Joint-space Vs Cartesian-space descriptions – Basics of trajectory planning – Joint-space trajectory planning – Cartesian-space trajectories

UNIT V CONTROL AND APPLICATION OF ROBOTICS 9

Linear control of robot manipulation – Second-order systems – Trajectory following control – Modeling and control of single joint – Architecture of industrial robotic controllers – Robot applications

Total: 45

TEXT BOOKS

1. Saced B. Niku, “Introduction to Robotics Analysis, Systems, Applications”, Prentice Hall of India, 2001
2. Craig, “Introduction to Robotics Mechanics and Control”, 2nd Edition, Pearson Education, 2004

REFERENCES

1. King Sun Fu, Rafael C. Gonzalez, George Lee C. S “Robotics: Control, Sensing, Vision and Intelligence”, McGraw-Hill International Editions, Industrial Engineering Series, 1991
2. Klafter R.D., Chimielewski T.A. and Negin M., “Robotic Engineering – An Integrated Approach”, Prentice Hall of India,1994

IC1003 – OPTIMAL CONTROL

(Common to EIE and ICE)

L	T	P	C
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UNIT I INTRODUCTION 9

Statement of optimal control problem – Problem formulation and forms of optimal control – Performance measures for optimal control – Selection of performance measure – Various methods of optimization – Linear programming – Non-linear programming – Dynamic programming

UNIT II DYNAMIC PROGRAMMING 9

Principle of optimality – Recurrent relation of dynamic programming for optimal control problem – Computational procedure for solving optimal control problems – Characteristics of dynamic programming solution – Hamilton Jacobi Bellman equation – Application to a continuous linear regulator problem

UNIT III CALCULUS OF VARIATIONS 9

Fundamentals concepts – Functional of a single function – Functional involving several independent functions – Piecewise smooth extremals – Constrained extrema

UNIT IV VARIATIONAL APPROACH TO OPTIMAL CONTROL 9

Necessary conditions for optimal control – Linear regulator problems – Pontryagin's minimum principle and state inequality constraints

UNIT V APPLICATIONS OF PONTRYAGIN'S MINIMUM PRINCIPLE 9

Minimum time problem – Minimum control effort problems minimum fuel problem – Minimum energy problem – Singular intervals in optimal control problems

Total: 45

TEXT BOOKS

1. Sarkar, B., "Control System Design – The Optimal Approach", Wheeler Publishing, 1997.
2. Gopal, M., "Modern Control System Theory", 2nd Edition, New Age International Ltd., 1993.

REFERENCES

1. Donald E. Kirk, "Optimal Control Theory – An Introduction", Pearson Education, 1970.
2. Kemin Zbou, Doyle, J.C., "Robust and Optimal Control", Pearson Education, 1996.

CS1033 – DATA COMMUNICATION AND NETWORKS

(Common to EEE, EIE and ICE)

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UNIT I DATA COMMUNICATION 9

Introduction – Networks – Protocols and standards – Standards organizations – Line configurations – Topology – Transmission mode – Categories of networks – Inter networks – OSI model – Functions of the layers – Encoding and modulating – Digital-to-digital conversion – Analog-to-digital conversion – Digital-to-analog conversion – Analog-to-analog conversion – Transmission media – Guided media – Unguided media – Transmission impairment – Performance

UNIT II ERROR CONTROL AND DATA LINK PROTOCOLS 9

Error detection and correction – Types of errors – Detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) – Check sum – Error correction – Data link control – Line discipline – Flow control – Error control – Data link protocols – Asynchronous protocols – Synchronous protocols – Character oriented protocols – BIT oriented protocols – Link access procedures

UNIT III NETWORKS AND SWITCHING 9

LAN – Project 802 – Ethernet – Token bus – Token ring – FDDI – MAN – IEEE 802.6 (DQDB) – SMDS – Switching: Circuit switching, Packet switching, Message switching

UNIT IV X.25, FRAME RELAY, ATM AND SONET/ SDH 9

X.25 – X.25 Layers – Frame relay: Introduction – Frame relay operation – Frame relay layers – Congestion control – Leaky bucket algorithm – Traffic control – ATM – Design goals – ATM architecture – ATM layers – ATM applications – SONET / SDH – Synchronous transport signals – Physical configuration – SONET layers – Applications

UNIT V NETWORKING DEVICES AND TCP / IP PROTOCOL SUITE 9

Networking and internetworking devices – Repeaters – Bridges – Gateways – Other devices – Routing algorithms – Distance vector routing – Link state routing – TCP / IP protocol suite – Overview of TCP/IP.Network layers – Addressing – Subnetting – Other protocols and network layers – Application layer – Domain Name System (DNS) – Telnet – File Transfer Protocol (FTP) – Trivial File Transfer Protocol (TFTP) – Simple Mail Transfer Protocol (SMTP) – Simple Network Management Protocol (SNMP)

Total: 45

TEXT BOOK

1. Behrouz A. Forouzan, “Data Communication and Networking”, 2nd Edition, Tata McGraw Hill, 2000.

REFERENCES

1. William Stallings, “Data and Computer Communication”, 8th Edition, Pearson Education / Prentice Hall of India, 2003.
2. Andrew Tannenbaum, S., “Computer Networks”, 4th Edition, Pearson Education / Prentice Hall of India, 2003.

IC1014 – INDUSTRIAL DRIVES AND CONTROL

L	T	P	C
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UNIT I INTRODUCTION TO ELECTRIC DRIVES 9

History and development of electric drives – Characteristics of Electrical and mechanical loads – Classification of electric drives – Basic elements and advantages of variable speed drives – Modes of operation – Closed loop control of drives – Selection of power rating for drive motors with regard to thermal overloading and load variation.

UNIT II DC DRIVES 9

Speed control of DC motors – Ward – Leonard scheme – drawbacks – Thyristor converter fed dc drives – Single – two and four quadrant operations – Chopper fed DC drives – Time ratio control and current limit control – Single – Two and four quadrant operations – Effect of ripples

UNIT III AC DRIVES 9

Speed control of 3 phase Induction Motors – Stator control – PWM andV/f control rotor control Rotor resistance control – Static control of rotor resistance using DC chopper – Static Krammer and Scherbius drives – Introduction to Vector Controlled Induction Motor Drives – Speed control of 3 phase Synchronous Motors – True synchronous and self controlled modes of operations

UNIT IV RELUCTANCE MOTOR DRIVES 9

DC servo drives principle of operation – AC servo drives principle of operation – Principle and control Stepper motor and SRM drives.

UNIT V DIGITAL CONTROL AND DRIVE APPLICATIONS 9

Digital techniques in speed control – Advantages and limitations – Microprocessor/Microcontroller and PLC based control of drives – Networking of drives – Selection of drives and control schemes for Steel rolling mills – Paper mills – Cement mills – Machine tools – Lifts and Cranes – Solar and battery powered drives.

Total: 45

TEXT BOOKS

1. Dubey, G.K., “Fundamentals of Electrical Drives”, Narosa Publishing House, 2003.
2. Bose, B.K., “Modern Power Electronics and AC Drives”, Pearson Education, 2003.

REFERENCES

1. Ion Boldea and Nasar, S.A., “Electric Drives”, CRC Press LLC, 1999.
2. Krishnan, R., “Electric Motor Drives: Modelling, Analysis and Control”, Prentice Hall of India, 2002.
3. Vedam Subramanyam, “Electric Drives: Concepts and Applications”, Tata McGraw-Hill, 2004.

ELECTIVE IV

EI1004 – INSTRUMENTATION IN PAPER INDUSTRIES

(Common to EIE and ICE)

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UNIT I DESCRIPTION OF THE PROCESS **9**

Raw material – Basic process – Pulping process – Chemical recovery process – Paper making Process –Converting

UNIT II MEASUREMENT HARDWARE AND ANALYZERS **9**

Measurement of basis weight – Sensors –Density-Specific gravity – Flow-level of liquids and solids – Detectors – Pressure – Temperature – Consistency sensors – Moisture analyzers – Oxidation – Redution Potential and pH – Graphic displays and alarms

UNIT III VALVES **9**

Selection factors – Valve types – Ball, butterfly, gate, plug, pinch applications

UNIT IV CONTROL SYSTEMS **9**

Blow down tank controls – Digester liquor feed pump controls – Brown stock washer level control – Stock chest level control – Basis weight control – Dryer temperature control – Dissolving tank density control – White liquor flow controls – Time storage silo level detection – Condensate conductivity control

UNIT V COMPUTER APPLICATIONS **9**

Application – Control and measuring devices – Stepper motor and gear train application – Industrial robots in production lines

Total: 45

TEXT BOOKS

1. Liptak, B.G., “Instrumentation in processing Industries”, Ghilton Book, 1973.
2. Considine, D.M., “Hand book of Applied Instrumentation” Tata McGraw-Hill,1984.

REFERENCES

1 Howar P. Kallen, “Hand book of Instrumentation and Control”, Tata McGraw-Hill, 1961.
2. Robert J. Bibbero, “Microprocessors in Industrial Control” ISA Press, 1983.
3. James A. Gupton Jr., “Computer Controlled Industrial Machine Process and Robots”, Prentice Hall of India, 1986.

IC1007 – INSTRUMENTATION AND CONTROL IN POWER SYSTEMS

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I INSTRUMENTATION AND CONTROL IN POWER GENERATION 9

Water Steam cycle fuels – steam generators – Electric power generation – Environmental conditions.

UNIT II ELECTRICAL AND PRESSURE MEASUREMENTS 9

Current – Voltage – Power-frequency – Reactive power – Maximum demand – Trivector meter – Pressure measurement: Steam pressure – Feed water pressure – Turbine head steam and de-aerator pressure – Drafts and very low pressure – Furnace draft – Uptake draft-Forced draft – Pulverizer differentials.

UNIT III TEMPERATURE AND FLOW MEASUREMENTS 9

Temperatures super heated steam temperature – Feed water and gas temperature – Flow – Steam flow – Fuel flow – Feed water flow – Air flow – Level: boiler drum water level – Hot well and de-aerator levels – Smoke density – pH and conductivity – Speed – Gas analysis – Steam and fuel gas sampling.

UNIT IV CONTROL OF LIQIUD LEVEL, TEMPERATURE VOLTAGE AND FREQUENCY 9

Control loop interactions – Feed water control – Drum level control – Re-circulation control – Control of reheat and steam temperature – Automatic voltage and frequency control.

UNIT V INSTRUMENTATION AND CONTROL IN ENERGY MANAGEMENT 9

Load dispatch computer – Dedicated microcomputer for sequencing data and alarming – Protective relaying

Total: 45

TEXT BOOKS

1. Considine, D.M. and Ross, S.F., “Hand book of Applied Instrumentation”, McGraw-Hill, 1964.
2. Doebelin, E.O., “Measurement Systems-Application and Design”, 5th Edition, Tata McGraw-Hill, 2004

REFERENCE

1. Liptak, B.G., “Instrumentation in Processing Industries” Ghilton Book Co., 1973.

EI1005 – TELEMETRY AND TELECONTROL

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I TELEMETRY FUNDAMENTALS AND CLASSIFICATION 9

Fundamental concepts and Significance – Functional blocks of Telemetry and telecontrol system – Methods of telemetry – Electrical, Pneumatic, Hydraulic and Optical Telemetry – State of the art – Telemetry standards

UNIT II LANDLINE TELEMETRY 9

Electrical Telemetry – Current Systems – Voltage Systems – Synchro Systems – Frequency systems – Position and pulse systems – Landline telemetry system

UNIT III RADIO TELEMETRY 9

Block diagram of a radio telemetry system – Transmitting and receiving techniques – AM – FM – PM – Multiplexing and demultiplexing – Transmitting and receiving techniques – Digital coding methods – Advantages of PCM, PWM, PM, FSK – Delta modulation – Coding and decoding equipment – Example of a radio telemetry system

UNIT IV OPTICAL TELEMETRY 9

Optical fibers for signal transmission – Sources for fiber optic transmission – Optical detectors – Trends in fiber – Optic device development – Example of an optical telemetry system

UNIT V TELECONTROL METHODS 9

Analog and Digital techniques in Telecontrol – Telecontrol apparatus – Remote adjustment – Guidance and regulation – Telecontrol using information theory – Example of a Telecontrol system

Total: 45

TEXT BOOKS

1. Gruenberg, L., “Handbook of Telemetry and Remote Control”, McGraw-Hill, 1987.
2. Swobodoa,G., “Telecontrol Methods and Applications of Telemetry and Remote Control”, Reinhold Publishing Corporation, 1988.

REFERENCES

1. Young, R.E., “Telemetry Engineering”, Little Books Ltd, 1988.
2. Housley, T., “Data Communication and Teleprocessing System”, Prentice Hall International, Englewood Cliffs, 1987.

EI1006 – INSTRUMENTATION FOR POLLUTION CONTROL

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I ENVIRONMENTAL MONITORING 9

Classification – Ambient environmental monitoring – Source monitoring – In-plant environment monitoring – Personal monitoring – Precision and accuracy – Errors in measuring signals

UNIT II AIR POLLUTION CONTROL 9

Air pollutant – Basis of monitoring technologies like conductometry – Coulometry – Turbidimetry – Nephlometry – Electrochemical cell method – Piezo-electric oscillation methods – Paper type method – Optical method – Air pollution monitoring instruments (manual and automatic)

UNIT III WATER POLLUTION MONITORING 9

Water pollutants – Basic techniques – Spectrometric methods – Emission spectrography – Automatic absorption spectro photometry – Absorption photometry – Potentimetry – Marine pollution monitoring – Polarography – Chromatogrophic method – Water pollution monitoring instruments – Auto analyzer for quality using flow injection analysis – Classical methods – GC, HPLC and ion chromatography

UNIT IV NOISE AND SOIL POLLUTION MONITORING 9

Noise pollution and its measurements – Soil pollution – Pollutants and its monitoring – Decibel meter – Psophometer – Noise pollution analyzer─anti noise device

UNIT V INDUSTRIAL POLLUTANTS AND ITS MONITORING 9

Monitoring of industrial pollution and pollution from hazardous wastes – Analysis techniques

Total: 45

TEXT BOOK

1. Sharma, B.K. and Kaur, H., “Environmental Chemistry”, Goel Publishing House, 1994.

REFERENCE

1. Andrew D. Eaton, Mary Ann H. Franson, “Standard Methods for the Examination of Water and Waste Water”, 20th Edition, APHA, 1998.

EI1007 – INSTRUMENTATION AND CONTROL IN IRON AND STEEL INDUSTRIES

(Common to EIE and ICE)

L	T	P	C
3	0	0	3

UNIT I FLOW DIAGARM AND DESCRIPTION OF PROCESS 9

Raw materials preparation – Iron making blast furnaces – Stoves – Raw steel making – Basic Oxygen furnace – Electric furnace.

UNIT II STEEL ROLLING 9

Casting of steel – Primary rolling – Cold rolling and finishing.

UNIT III INSTRUMENTATION 9

Measurement of level-pressure – Density – Temperature – Flow weight – Thickness and shape – Graphic displays and alarms.

UNIT IV CONTROL AND SYSTEMS 9

Blast furnace stove combustion control system – Gas and water controls in BOF – Stand casting mould level control.

UNIT V COMPUTER APPLICATIONS 9

Model calculating and logging – Rolling mill control computer – Annealing process control computer – Center utilities dispatch computer.

Total: 45

TEXT BOOK

1. Liptak, B.G., “Instrumentation in Processing Industries” Ghilton Book Co., 1973.

REFERENCE

1. Considine, D.M., “Hand book of Applied Instrumentation”, McGraw-Hill, 1984.