

Applied Electronics & Instrumentation Engg (Old)

Syllabus of Applied Electronics & Instrumentation Engineering
COURSE STRUCTURE
(Common to All Branches of B.Tech Programme)

SEMESTER – III

A. THEORY							
Sl. No.	Code	Subjects	Contacts (periods/week)				Credit points
			L	T	P	Total	
	M 302	Mathematics	3	1	-	4	4
	EE 301	Circuit Theory and Networks	3	1	-	4	4
	EC 301	Solid State Devices & Circuits	3	0	-	3	3
	EE 302	Electrical and Electronic Measurement	3	1	-	4	4
	CS 302	Data Structure & Algorithms	3	1	-	4	4
6.	CS 312	Numerical Methods and Programming	3	0	-	3	3
Total of Theory						22	22
B. PRACTICALS							
7.	EE 391	Circuits and Networks Lab.	-	-	3	3	2
8.	EE 392	Electrical and Electronic Measurement Lab.	-	-	3	3	2
9.	CS 392	Data Structure Lab	-	-	3	3	2
10.	CS 382	Numerical Methods & Programming Lab.	-	-	3	3	2
Total of Practical						12	8
Total of Semester -						34	30

FOURTH SEMESTER

A.THEORY:

A. THEORY				
	Code	Subjects	Contacts (periods/week)	Credit points

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			L	T	P	Total	
	EC 401	Analog Electronic Circuits	3	0	0	3	3
	EC 402	Digital Electronics & Integrated Circuits	3	1	0	4	4
	EI 402	Electronic Measurements & Instrumentation	3	0	0	3	3
	CS 404	Computer Organization & Architecture	3	0	0	3	3
	EI 401	Transducer & Sensors	3	0	0	3	3
Total of Theory						16	16

B. PRACTICAL:

			Contact Periods			Total Credit	
			Per Week			Total	Credit
			L	T	P		
	EC 491	Analog Electronic Circuits Lab.	0	0	3	3	2
	EC 492	Digital Electronics & Integrated Circuits Lab.	0	0	3	3	2
	EI 492	Electronic Measurements & Instrumentation Lab	0	0	3	3	2
	EI 491	Transducer & Sensors Lab	0	0	3	3	2
Total of Practical						12	8
Total of 4th Semester -						28	24

C. SESSIONAL:

HU 481	Technical Report writing & / Language Practice Lab	0	0	0	3	2
TOTAL OF SESSIONAL					3	2
TOTAL :					31	26

SEMESTER - V

A. THEORY							
Sl. No.	Code	Subjects	Contacts (periods/week)				Credit points
			L	T	P	Total	
1.	EI 501	Industrial Instrumentation	3	0	-	3	3
2.	EI 502	Microprocessors and Micro-controllers	3	1	-	4	4
3.	EI 503	Opto-electronics and Instruments.	3	0	-	3	3
4.	EC 511	Communication Theory	3	1	-	4	4
5.	EE 511	Linear and Digital Control System	3	1	-	4	4
Total of Theory						18	18
B. PRACTICALS							
1.	EI591	Industrial Instrumentation Lab.	-	-	3	3	2
2.	EI592	Microprocessors and Micro-controllers Lab.	-	-	3	3	2
3.	EC581	Communication Lab.	-	-	3	3	2
4.	EE581	Linear and Digital Control System Lab.	-	-	3	3	2
Total of Practical						12	8
C. SESSIONALS							
				0	0	0	0
Total of Sessionals						0	0
Total of Semester -						30	26

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Sixth Semester

A. THEORY:

SL NO.	CODE	THEORY	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EI 601	Process Control	3	0	0	3	3
2	EI 602	Microprocessor Based System	3	0	0	3	3
3	EC 611	Digital Signal Processing	3	1	0	4	4
4	EE 604	Power Electronics	3	1	0	4	4
5	CS 611	Computer Network & Internetworking	3	0	0	3	3
TOTAL THEORY			15	2	0	17	17

B. PRATICAL:

SL NO.	CODE	PRACTICAL	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EI 691	Process Control Lab.	0	0	3	3	2
2	EI 692	Microprocessor Based System Lab.	0	0	3	3	2
3	EE 684	Power Electronics Lab.	0	0	3	3	2
4	CS 681	Computer Networking Lab.	0	0	3	3	2
TOTAL PRACTICAL						12	8

C. SESSIONAL:

1	EI 682	Group Discussion and Seminar				3	2
TOTAL SESSIONAL						3	2

Total of Semester:

32

27

6 Week Industrial Training during Summer Vacation

Seventh Semester

A. THEORY:

SL NO.	CODE	THEORY	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EI 701	Remote Control & Telemetry	3	0	0	3	3
2	HU 701	Financial Management & Accounts	3	0	0	3	3
3	IT 711	Multimedia Systems	3	0	0	3	3
4	EI 702	Elective I	3	0	0	3	3
5	EI 703	Elective II	3	0	0	3	3
TOTAL THEORY			15	0	0	15	15

B. PRACTICAL:

SL NO.	CODE	PRACTICAL	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EI 791	Remote Control & Telemetry Lab	0	0	3	3	2
2	IT 781	Multimedia Systems Lab.	0	0	3	3	2
3	EI 794	Assigned Project	-	-	6	6	4
TOTAL PRACTICAL			0	0	12	12	8

A. SESSIONAL:

1	EI 781	Practical Training Evaluation	-	-	-	-	3
2	EI 782	Seminar on Assigned/selected Topics	0	0	3	3	2
TOTAL SESSIONAL						3	5

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Total of Semester:

30

28

List of Elective Papers:

Elective I (EI 702)	Elective II (EI 703)
<ul style="list-style-type: none"> a) Non-destructive Testing b) Wireless and Mobile communication c) Advanced Microprocessors d) VHDL and Gated Arrays e) Advanced Process Control 	<ul style="list-style-type: none"> a) Ultrasonic Instrumentation b) Advanced Sensors c) Computer Communication d) Microelectronics & VLSI Technology

Eight Semester

A.THEORY:

SL NO.	CODE	THEORY	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	HU 801	Values and Ethics in Profession	3	0	0	3	3
2	HU 802	Industrial Management	3	0	0	3	3
3	EI/CS 801	Elective III	3	0	0	3	3
4	EC/EE/C S/M-802	Elective IV	3	0	0	3	3
TOTAL THEORY			12	0	0	12	12

B.PRATICAL:

SL NO.	CODE	PRACTICAL	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EI 893	Assigned Project	-	-	12	12	8
TOTAL PRACTICAL			-	-	12	12	8

C.SESSIONAL:

1	EI 881	Personality Development	-	-	3	3	2
2	EI 882	Comprehensive Viva Voce	-	-	-	-	4
TOTAL SESSIONAL					3	3	6

Total of Semester:

27

26

List of Elective Papers:

Elective III	Elective IV
<ul style="list-style-type: none"> • Advanced Numerical Computation-EI-801(a) • Bio Medical Instrumentation-EI-801(b) • Analytical Instrumentation-EI-801© • Pattern Recognition-CS-801(g) 	<ul style="list-style-type: none"> • Project Management and Operation Research-M-802(ga) • Non Conventional Energy Sources-EE-802(g) • Robotics-EI-802© • Soft Computing – Theory and Applications-CS-802(g)

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MATHEMATICS

MATHEMATICS

Code: M 302

Contacts: 3L + 1T

Credits: 4

Fourier Series:

Introduction: Euler's formula; Problems on general Fourier Series; Conditions for Fourier Expansion; Fourier Expansions of Discontinuous Functions; Even and Odd functions; Change of interval; Half range series; Typical Waveforms (Square, Saw-toothed, Triangular, Half Wave rectifier, Full Wave rectifier); Parseval's Identity (statement only); Fourier Transform (FT) and its properties; Inverse Fourier Transform (statement only); Fourier transform of derivative (statement only); Convolution (statement only); Application of Fourier Transform in solving partial differential equations — Laplace's Equation (2D only), Heat Conduction Equation (1D only) and Wave Equation (1D only). 12L

Calculus of Complex Variable:

Functions; Limits and Continuity; Analytic Functions; Cauchy Riemann Conditions; Analytic Continuation; Complex Integration and Cauchy's Theorem; Cauchy's Integral Formula; Taylor's and Laurent Series; Zeros of an Analytic Function; Poles; Essential Singularities; Residue Theorem (statement only) and its application to evaluation of integral; Introduction to Conformal Mapping; Simple problems. 14L

Probability and Statistics:

Mean, Median, Mode and Standard Deviation; Samples Space; Definition of Probability; Conditional Probability; General Multiplication Theorem; Independent Events; Bayes' Theorem; Random Variable; Discrete and Continuous Probability Distributions - Probability mass function; Probability density function; Distribution Function; Expectation; Variance; Probability Distribution—Binomial, Poisson and Normal. Correlation and Regression; Method of Least Squares; Linear Curve Fitting. 10L

Graph Theory:

Graphs; Digraphs; Isomorphism; Walk; Path; Circuit; Shortest Path: Dijkstra's Algorithm; Tree; Properties of Tree; Binary Tree; Fundamental Circuit; Minimal Spanning Tree: Kruskal's Algorithm; Prim's Algorithm. Cut Set; Fundamental Cut Set and Cut Vertices; Matrix Representation of Graphs (Adjacency and Incidence Matrices); Network; Flow Augmenting Path; Ford-Fulkerson Algorithm for Maximum Flow; Max Flow – Min Cut Theorem (statement only). 12L

Total 48L

Text Books:

1. Rathor, Choudhari,: Discrete Structure And Graph Theory.
2. Gupta S. C and Kapoor V K: Fundamentals of Mathematical Statistics - Sultan Chand & Sons.
3. Lipschutz S: Theory and Problems of Probability (Schaum's Outline Series) - McGraw Hill Book Co.
4. Spiegel M R: Theory and Problems of Probability and Statistics (Schaum's Outline Series) - McGraw Hill Book Co.
5. Goon A.M., Gupta M K and Dasgupta B: Fundamental of Statistics - The World Press Pvt. Ltd.
6. Spiegel M R: Theory and Problems of Complex Variables (Schaum's Outline Series) - McGraw Hill Book Co.
7. Bronson R: Differential Equations (Schaum's Outline Series) - McGraw Hill Book Co.
8. Ross S L: Differential Equations - John Willey & Sons.
9. Sneddon I. N.: Elements of Partial Differential Equations - McGraw Hill Book Co.
10. West D.B.: Introduction to Graph Theory - Prentice Hall
11. Deo N: Graph Theory with Applications to Engineering and Computer Science - Prentice Hall.
12. Grewal B S: Higher Engineering Mathematics (thirtyfifth edn) - Khanna Pub.
13. Kreyzig E: Advanced Engineering Mathematics - John Wiley and Sons.
14. Jana- Undergraduate Mathematics
15. Lakshminarayan- Engineering Math 1.2.3
16. Gupta- Mathematical Physics (Vikas)
17. Singh- Modern Algebra
18. Rao B: Differential Equations with Applications & Programs, Universities Press
19. Murray: Introductory Courses in Differential Equations, Universities Press
20. Delampady, M: Probability & Statistics, Universities Press
21. Prasad: Partial Differential Equations, New Age International

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22. Chowdhury: Elements of Complex Analysis, New Age International
23. Bhat: Modern Probability Theory, New Age International
24. Dutta: A Textbook of Engineering Mathematics Vol.1 & 2, New Age International
25. Sarveswarao: Engineering Mathematics, Universities Press
26. Dhani: Differential Calculus, New Age International

CIRCUIT THEORY & NETWORKS

Code: EE 301

Contact: 3L + IT

Credit: 4

Different types of systems & networks: continuous & Discrete, Fixed and Time varying, Linear and Non-linear, Lumped and distributed, Passive & Active Networks & Systems

Laplace transform of impulse and sinusoidal steps waveforms for RL, RC, LC and RLC Circuits. Transient analysis of different electrical circuits with and without initial conditions, Fourier Series and Fourier Transform

Network theorems and their applications in circuit analysis, Formulation of network equations, Source transformations, Loop variable analysis and node variable analysis

Graph of network, concept of tree branch, tree link. Incidence matrix, Tie-set matrix and loop currents, Cut set matrix and node pair potentials

Two port networks, Open circuit Impedance and Short circuit Admittance parameters, Transmission parameters, hybrid parameters, and their inter-relations

Indefinite admittance matrix- their applications to the analysis of active network

Active filter analysis and synthesis using operational amplifier

SPICE: How SPICE works. Model statement, models for passive and active device, D.C. circuits analysis, small signal analysis, capacitors and inductors in D.C. Circuits, steady state and transient, plotting and printing, input and output Impedance, D.C. sensitivity analysis, harmonic decomposition (Fourier Series), Harmonic re-composition, voltage controlled components

Text books :

1. Sudhakar:Circuits & Networks:Analysis & Synthesis 2/e TMH New Delhi
2. Valkenburg M. E. Van, "Network Analysis", Prentice Hall.
- 3.Engineering circuit analysis with PSPICE and probe-Roger, MH
- 4.Engg Circuit Analysis,: Hayt 6/e Tata McGraw-Hill
- 5.A. Chakravarty: Networks, Filters & Transmission Lines
- 6.D.Chattopadhyay and P.C.Rakshit: Electrical Circuits
- 7.A.V. Oppenheimer and A.S.Wilsky: Signals & Systems, PHI
- 8.R.V.Jalgaonkar.: Network Analysis & Synthesis.EPH.
- 9.Gupta: Circuit Analysis with Computer Application, New Age International
- 10.Mann: Introductory A.C.Circuit Theory, Universities Press
- 11.Aatre: Network Theory & Filter Design, New Age International
- 12.Adby: Applied Circuit Theory, New Age International
- 13.Wadhwa: Network Analysis & Synthesis, New Age International
- 14.Roychowdhury: Linear Integrated Circuits, New Age International
- 15.Roy Choudhury D., "Networks and Systems", New Age International Publishers.
16. V.K. Chandna, A Text Book of Network Theory & Circuit Analysis, Cyber Tech

References :

1. Reza F. M. and Seely S., "Modern Network Analysis", Mc.Graw Hill Book Company
2. Kuo F. F., "Network Analysis & Synthesis", John Wiley & Sons.

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SOLID STATE DEVICES & CIRCUITS

Code: EC 301

Contacts: 3L

Credits: 3

Transport phenomena in solids – drift and diffusion. Properties of p-n and metal semiconductor junctions, rectifier and detector diodes, photovoltaic effect-solar cells, zener and tunnel diodes

Varactor gunn and impatt diodes, Bipolar transistor – physical mechanism, current gain, punch-through and avalanche effect

High voltage and high power transistors

Field effect transistors –JFETS and IJFETS. MOS-capacitors-flat band and threshold voltages –P-and N-channel MOSFETS, CMOS and VLSI MOSFETS, Semi conductor sensors and detectors. LEDs & LCDs, Elements of device fabrications technology

Different configurations of feedback amplifiers-voltage series, voltage shunt, current series and current shunt, effects on gain, i/p and o/p impedance's, positive feedback and oscillator circuits- phase shift, wien bridge, hartlay, colpitt and crystal oscillators.

Books :

1. Millman & Halkias - Integrated Electronics, THH
2. Millman & Grabel, - MGH Micro-Electronics
3. Neaman:Semiconductor physics & devices MGH
4. Malvino - Principle of Electronics, TMH

Kasap:Principles of electronic Materials & devices 2/e TMH, New Delhi

Linear Integrated Circuits and Applications – Y.Venkatramani, ISTE/EXCEL BOOKS

6. Chattopadhyay, Rakshit, Saha & Purkait, 2nd, Edn--: Foundation of Electronics

7. Manish Mukherjee.: Foundation Of Electronics Devices & Circuits. EPH.

Basavraj- Basic Electronics, Vikas

Roy D.K. – Physics of Semiconductor Devices, Universities Press

Roychowdhury: Linear Integrated Circuits, New Age International

Sharma: Semiconductor Electronics, New Age International

Singh: Microelectronic Devices & Circuits, New Age International

Bali: Solid State Devices & Circuits, New Age International

ELECTRICAL AND ELECTRONIC MEASUREMENT

Code : EE 302

Contacts : 3L + 1T

Credits : 4

General features – Construction and principle of operation of moving coil, moving iron, Dynamometer, Thermal and Rectifier type deflecting instruments. Deflecting, controlling and damping torques, extension of instrument ranges using shunts, multipliers and instrument transformers. Measurement of low, medium and high resistances, Kelvins double bridge, multimeters, megger, localization of cable faults.

D.C. and A.C. potentiometers, Measurement of high voltage, Electrostatic instruments, measurement of inductances, capacitance and frequency by A.C. Bridges.

Measurement of power in polyphase circuits, various wattmeter connections. A.C. and D.C. energy meters.

C.R.O. construction & principle measurement of voltage, current, frequency and phase by oscilloscope.

Electronic voltmeters – analog and digital. Digital multimeters, Audio oscillators, signal generators and frequency counter.

Text Books:

1. Golding E.W. & Wides F.C. : Electrical Measuring Instruments & Measurements ; Wheeler

2. Kalsi: Electronic Instrumentation TMH

a. Sawhney A K : A course in Electrical & Electronic Measurements & Instruments, Dhanpat Rai & Co.

4. Industrial Instrumentation & Control : SK Singh TMH

5. Heltrick A.D. & Cooper W.D. : Modern Electronic Instrumentation & Measuring Instruments; Wheeler

6. Patranabis D: Sensors & Transducers, Wheeler 96

7. R.V. Jalgaonkar.: Electronics Instrumentation.

1. Sutko- Industrial Instrumentation, Vikas

2. Rajarao: Principles of Medical Electronics & Biomedical Instrumentation, Universities Press

3. Bolton: Industrial Control & Instrumentation, Universities Press

4. Bolton: Instrumentation & Process Measurement, Universities Press

5. Reissland M.U.: Electrical Measurement, New Age International

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DATA STRUCTURES AND ALGORITHMS

Code: CS 302

Contact: 3L + IT

Credit: 4

Overview of C language

Time and Space analysis of Algorithms - Order Notations.

Linear Data Structures - Sequential representations - Arrays and Lists, Stacks, Queues and Dequeues, strings, Application.

Linear Data Structures - Link Representation - Linear linked lists, Circularly linked lists. Doubly linked lists, application.

Recursion - Design of recursive algorithms, Tail Recursion, When not to use recursion, Removal of recursion.

Non-linear Data Structure : Trees - Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height-balanced and weight-balanced trees, B-trees, B+ -trees, Application of trees; Graphs - Representations, Breadth-first and Depth-first Search.

Hashing - Hashing Functions, collision Resolution Techniques.

Sorting and Searching Algorithms - Bubble sort, Selection Sort, Insertion Sort, Quicksort, Merge Sort, Heapsort and Radix Sort.

File Structures - Sequential and Direct Access. Relative Files, Indexed Files - B+ tree as index. Multi-indexed Files, Inverted Files, Hashed Files.

Text books:

1. Data Structures and Algorithms – O.G. Kakde and U.A. Deshpandey, ISTE/EXCEL BOOKS
2. Aho Alfred V., Hopperoff John E., Ullman Jeffrey D., “Data Structures and Algorithms”, Addison Wesley
 1. Data Structure by Lipschutz, TMH
2. Drozdek_ Data Structures and Algorithms, Vikas
3. Pujari A.K.: Data Mining, Universities Press
6. Ajay Agarwal, Data Structure Through C, Cyber Tech

References :

1. Heileman: Data Structure ,Algorithms &Oop Tata Mcgrawhill
2. Data Structures Using C–M.Radhakrishnan and V.Srinivasan, ISTE/EXCEL BOOKS
3. Weiss Mark Allen, “Algorithms, Data Structures, and Problem Solving with C++”, Addison Wesley.
3. Horowitz Ellis & Sartaj Sahn, “Fundamentals of Data Structures”, Galgotria Pub.
4. Tanenbaum A. S. , “Data Structures using ‘C’ ”

NUMERICAL METHODS AND PROGRAMMING

Code : CS 312

Contacts : 3L

Credits : 3

Approximation in numerical computation, Truncation and rounding errors;

Interpolation: Lagrange’s Interpolation, Newton forward & backward differences Interpolation, Newton divided difference;

Numerical Integration: Trapezoidal, Rule, Simson’s 1/3 Rule, Weddle’ Rule;

Numerical Solution of a system of linear equation

Gauss elimination method, Matrix Inversion, LU Factorization method, Gauss Jacobi method, Gauss Seidal method;

Algebraic Equation: Bisection method, Secant method, Regular-Falsi method, Newton-Raphson method;

Numerical solution of ordinary differential equation: Taylor’s series method, Euler’s method, Runge-kutta method, Predictor-Corrector method;

C Language Overview: Loop, recursion, function, array, pointers, structures, various types of file access methods: Sequential, Indexed Sequential, Random;

Various types of files in C and various types file handling statements in C

Implementation above Numerical & Statistical Problems in C Language;

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Text Books:

- 1 Numerical Analysis & Algorithms, Pradeep Niyogi, TMH, 1st ed.
 - 2 C Language and Numerical Methods by C.Xavier
 - 3 Introductory Numerical Analysis by Dutta & Jana
 - 4 Numerical Method:Balagurusamy
 - 5 Numerical Mathematical Analysis by J.B.Scarborough
 - 6 Numerical Methods (Problems and Solution) by Jain, Iyengar , & Jain
 - 7 Numerical Methods In Computer Applications – P.U.Wayse. EPH
- Computer Oreinted Numerical Method- Dutta,N. ,Vikas
Numerical Methods with Programs in Basic Fortran Pascal & C++ - S.B.Rao, Universities Press
Computer Programming & Numerical Analysis – N.Dutta, Universities Press
Numerical Methods for Engineers – Gupta, New Age International
Numerical Solutions of Differential Equations – Jain M.K.,New Age International
Numerical Methods for Scientific & Engg Computation – Jain M.K.,New Age International
Numerical Analysis – Rao G.S.,New Age International
Discrete Mathematical Structures – Rao G.S., New Age International
Foundations of Discrete Mathematics – Joshi K.D., New Age International
Applied Discrete Structures – Joshi, New Age International
Groups, Rings & Modules with Applications – Adhikari, M.R.,Universities Press

CIRCUITS & NETWORK LAB

Code: EE 391

Contact: 3P

Credit: 2

List of Experiments:

1. Transient response in R-L and R-C Network: Simulation/hardware
2. Transient response in R-L-C Series & Parallel circuits Network: Simulation/hardware
3. Determination of Impedance (Z) and Admittance(Y) parameters of two port network
4. Frequency response of LP and HP filters
5. Frequency response of BP and BR filters
6. Generation of Periodic, Exponential, Sinusoidal, Damped sinusoidal, Step, Impulse, Ramp signals using MATLAB in both discrete and analog form
7. Evaluation of convolution integral, Discrete Fourier transform for periodic & non-periodic signals and simulation of difference equations using MATLAB
8. Representation of poles and zeros in z-plane, determination of partial fraction expansion in z-domain and cascade connection of second order system using MATLAB
9. Determination of Laplace transform and inverse Laplace transformation using MATLAB
10. Spectrum analysis of different signals

Note: An Institution/College may opt for some other software or hardware simulation wherever possible in place of MATLAB

ELECTRICAL AND ELECTRONIC MEASUREMENT LAB

Code: EE 392

Contact: 3P

Credit: 2

List of Experiments:

1. Instrument workshop- observe the construction of PMMC, Dynamometer, Electro thermal and Rectifier type instrument, Oscilloscope and digital multimeter
2. Calibrate moving iron and electro-dynamometer type ammeter/volmeter by potentiometer
3. Calibrate dynamometer type Wattmeter by potentiometer
4. Calibrate A.C. energy meter

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5. Measure the resistivity of material using Kelvin Double Bridge
6. Measurement of Power using Instrument transformer
7. Measurement of Power in Polyphase circuits
8. Measurement of Frequency by Wien Bridge using Oscilloscope
9. Measurement of Inductance by Anderson Bridge
10. Measurement of Capacitance by De Sauty Bridge

DATA STRUCTURE LAB

Code: CS 392

Contact: 3P

Credit: 2

Experiments should include but not limited to :

Implementation of array operations :

Stacks and Queues : adding, deleting elements Circular Queue : Adding & deleting elements Merging Problem : Evaluation of expressions operations on Multiple stacks & queues :

Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists:

Polynomial addition, Polynomial multiplication

Sparse Matrices : Multiplication, addition.

Recursive and Nonrecursive traversal of Trees

Threaded binary tree traversal. AVL tree implementation.

Application of Trees. Application of sorting and searching algorithms

Hash tables implementation, searching, inserting and deleting, searching & sorting techniques

NUMERICAL METHODS & PROGRAMMING LAB

Code: CS 382

Contact: 3P

Credit: 2

1. Assignments on Interpolation: Newton forward & backward, Lagrange
2. Assignments on Numerical Integration: Trapezoidal Rule, Simson's 1/3 Rule, Weddle's Rule
3. Assignments on Numerical solution of a system of linear equation: Gauss elimination, Gauss Jacobi, Matrix Inversion, Gauss Seidal
4. Assignments on Algebraic Equation: Bisection, Secant, Regular-falsi, Newton Raphson
5. Assignments on Ordinary Differential Equation: Taylor Series, Euler's method, Runge-Kutta
Assignments on Statistical Problem: Mean, Median, Mode, Standard deviation (for simple & frequency type data), Correlation & Regression

ANALOG ELECTRONIC CIRCUITS

Code : EC 401

Contacts : 3L

Credits :3

Transistor Biasing and Stability: Self Bias-CE, CC, Compensation techniques. Voltage, current, transresistance & transconductance amplifier. High frequency model of transistor.

Power amplifiers – Class A, B, AB, C, Tuned amplifier.

Different stages of Operational Amplifier: Differential Amplifier, Constant current source (current mirror etc.), level shifter, Ideal and practical OpAmp. Comparator, Schmitt Trigger. Instrumentation Amplifier, Log & Anti-log amplifiers, Trans-conductance multiplier, Precision Rectifier

Multivibrator – Monostable, Bistable, Astable.

Timer. Monostable and astable operation using 555 timer.

Linear voltage regulator : series and shunt.

Switched mode power supply.

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Function generator, wave shapers.
V-I, I-V, V-F & F-V converters. VCO, PLL lock-in amplifier.

Text Book:

1. Millman & Halkias – Integrated Electronics, Tata McGraw Hill.
2. Franco—Design with Operational Amplifiers & Analog Integrated Circuits , 3/e, TMH
3. Schilling & Belone—Electronic Circuit: Discrete & Integrated , 3/e , TMH
4. Gayakwad R.A -- OpAmps and Linear IC's, PHI
5. Coughlin and Drisscol – Operational Amplifier and Linear Integrated Circuits – Pearson Education Asia.

Reference:

1. Malvino—Electronic Principles , 6/e , TMH
2. Millman & Taub- Pulse, Digital & switching waveforms- TMH
3. Horowitz & Hill- The Art of Electronics; Cambridge University Press.
4. Hayes & Horowitz- Student Manual for The Analog Electronics; Cambridge University Press.
5. Boyle'stead & Nashelsky: Electronic Devices & Circuit theory, PHI.
6. Millman & Halkias: Basic Electronic Principles; TMH.
7. Tobey & Grame – Operational Amplifier: Design and Applications, Mc Graw Hill.
8. Tushar Jadhav – Linear Integrated Circuits, Everest Publishing House.

DIGITAL ELECTRONICS & INTEGRATED CIRCUITS

Code : EC 402

Contacts : 3L + 1T

Credits : 4

Data and number systems, Binary representation, Codes and their conversions: BCD, Octal, Hexadecimal, ASCII, EBCDIC, Gray, Signed binary number representation with 1's and 2's complement methods, Binary arithmetic.

Boolean algebra, Venn diagram, logic gates and circuits, Minimization of logic expressions by algebraic method, K-map method and Quine Mc Clauskey method

Combinational circuits- adder, subtractor, encoder, decoder, comparator, multiplexer, de-multiplexer, parity generator, etc

Design of combinational circuits-Programming logic devices and gate arrays.

Sequential Circuits- Flip Flops, various types of Registers and counters and their design, Irregular counter, State table and state transition diagram, sequential circuits design methodology.

Different types of A/D and D/A conversion techniques.

Different Logic families- TTL, ECL, MOS and CMOS, their operation and specifications.

Memory Systems: RAM, ROM, EPROM, EEROM

Textbooks:

1. Jain—Modern Digital Electronics, 2/e , TMH
2. Leach & Malvino—Digital Principles & Application, 5/e, TMH
3. Digital Logic Design- Morris Mano, PHI.

Reference:

1. Digital Integrated Electronics- H. Taub & D. Shilling, Mc Graw Hill.
2. Givone—Digital Principles & Design, TMH
3. Digital Technology- Virendra Kumar, New Age.
4. Digital Circuit & Design- S. Aligahanan, S. Aribazhagan, Bikas Publishing House.
5. Fundamentals of Digital Electronics & Microprocessor- Anokh Singh, A.K. Chhabra, S. Chand.
6. Introduction to Digital Computer Design 4th Ed.- V. Rajaraman & T. Radhakrishnan, P.H.I.

Applied Electronics & Instrumentation Engg (Old)

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

EI 402

Contacts: 3L

Credits: 4

Basis Measurement Techniques for Analog and Digital Measurements Units and standards of physical quantities. Documentation standards. Block diagram of Instrumentation schemes – Static and Dynamic.

Accuracy, Precision, Fidelity, speed of response, Linearization of techniques.

Errors in measurement : Classifications of errors, Statistical Analysis, Introduction to Reliability.

Digital Multimeters, Theory of Operational and Constructinal Details SHE, A-D-C D-A-C, Multiplexing, Data Acquisition Systems, Actuator, Elements of Transducer, Analog Multiplier, R M S and Average value detectors, Wave and Spectrum Analysers, Q-meters.

Measurement of high frequencies RF and VHF

Text:

- 1.Jain—Digital Electronics, 2/e,TMH
- 2.Kalsi—Electronic Instrumentation , TMH
- 3.Malvino & Leach – Digital Principles & Application , 5/e,TMH
- 4.Helric A.D & Cooper W.D—Modern Electronic Instrumentation & Measuring Instruments, Wheeler Pub.
- 5.Dhir S.M—Applied Electronics & Instrumentation, TMH

Reference:

1. Taub & Schilling – Digital Integrated Electronics,TMH
2. Givone—Digital Principles & Design,TMH
3. Shawney A.K—Acourse in Electrical & Electronic Measurements, Dhanpat Rai & Sons.
4. Bowens – Digital Instrumentation , TMH
5. Jones—Instrumentation , Measurement & Feedback, TMH

Computer Organisation & Architecture

Code: CS 404

Contact: 3L

Credit: 3

Concepts & Terminology : Digital computer concepts; Von-Neumann concept ; Hardware & Software and their nature ; structure & functions of a computer system , Role of operating system.

Memory Unit : Memory classification , characteristics ; Organization of RAM , address decoding ROM/PROM/EEPROM ; Magnetic memories , recording formats & methods , Disk & tape units; Concept of memory map , memory hierarchy , Associative memory organization ; Cache introduction , techniques to reduce cache misses , concept of virtual memory & paging.

CPU Design: The ALU – ALU organization , Integer representation , 1s and 2s complement arithmetic ; Serial & Parallel Address; implementation of high speed Address Carry Look Ahead & carry Save Address; Multiplication of signed binary numbers-Booth's algorithm ; Divide algorithms- Restoring & Non-Restoring ; Floating point number arithmetic; Overflow detection , status flags.

Instruction Set Architecture- Choice of instruction set ; Instruction word formats ; Addressing modes.

Control Design – Timing diagrams; T-States , Controlling arithmetic & logic instruction , control structures ; Hardwired & Micro programmed, CISC & RISC characteristics.

Pipelining-general concept , speed up , instruction & arithmetic pipeline; Examples of some pipeline in modern processors , pipeline hazards; Flynn's classification –SISD ,SIMD , MISD , MIMD architectures-Vector and Array processors & their comparison , Concept of Multiprocessor; Centralized & distributed architectures.

Input/output Organization : Introduction to Bus architecture , effect of bus widths , Programmed & Interrupt I/O , DMA.

Text:

- 1.Hayes-- Computer Architecture & Organization,3/e ,MH
- 2.Carter—Computer Architecture (Schaum Series), TMH
- 3.Mano M.M—“Computer System Architecture”
- 4.Chaudhury P. Pal—“ Computer Organization & Design” , PHI

Reference:

Applied Electronics & Instrumentation Engg (Old)

- 1.Hamacher—Computer Organization, 5/e, MH
- 2.Stallings W—“ Computer Organization & Architecture” , MH

TRANSDUCERS & SENSORS

EI 401

Contacts: 3L

Credits: 3

Transducers-classification. Resistance types ; potentiometers, strain gauge etc. and their applications. Inductance type LVDT, variable reluctance transducers-principle and applications. Capacitance type; dielectric, capacitance bridge & microphones. Transducers for velocity, acceleration, force and torque. Vibration and piezo-electric transducers. Noise introduced by transducers and their reduction.

IR and UV detectors, ionisation chambers. Radiation pyrometers. Ultrasonic devices, magnetostrictive devices. Photo-detectors, photo-multipliers. LDR, LED's

Books :

1. Doebelin E.O. - Measurement System : Application & Design , MGH Tokyo
2. Bentley J.P.- Principle of Measurement System, Longman Scientific & Technical, Singapur, 3rd Edn. 1995.
3. Patranabis D -Sensors & Transducers , Wheeler, 1996.
4. Neubert HKP -Instrument Transducers – An introduction to their performance & design , Clarendon Press, 2nd End., 1975.
5. Murthy DVS – Transducers & Instrumentation, PHI, ND, 1995.
6. Jone B.E.- Instrumentation, Measurement and Feedback ,TMH, 1983.
7. Dhiv S M- Applied Electronics & Instrumentation ,

ANALOG ELECTRONIC CIRCUITS LAB

EC 491

Contacts: 3P

Credits: 2

1. Introduction: Study of characteristics curves of B.J.T & F.E.T .
2. Construction of a two-stage R-C coupled amplifier & study of it's gain & Bandwidth.
3. Study of class A & class B power amplifiers.
4. Study of class C & Push-Pull amplifiers.
5. Realization of current mirror & level shifter circuit using Operational Amplifiers.
6. Study of timer circuit using NE555 & configuration for monostable & astable multivibrator.
7. Construction & study of Bistable multivibrator using NE555.
8. Study of Switched Mode Power Supply & construction of a linear voltage regulator using regulator IC chip.
9. Construction of a simple function generator using IC.
10. Realization of a V-to-I & I-to-V converter using Op-Amps.
11. Realization of a Phase Locked Loop using Voltage Controlled Oscillator (VCO).
12. Study of D.A.C & A.D.C.

DIGITAL ELECTRONIC & INTEGRATED CIRCUITS LAB

EC 492

Contacts: 3P

Credits: 2

1. Realization of basic gates using Universal logic gates.
2. Code conversion circuits- BCD to Excess-3 & vice-versa.
- 3 .4-bit parity generator & comparator circuits.
4. Construction of simple Decoder & Multiplexer circuits using logic gates.
5. Design of combinational circuit for BCD to decimal conversion to drive 7-segment display using multiplexer.
6. Construction of simple arithmetic circuits-Adder, Subtractor.
7. Realization of RS-JK & D flip-flops using Universal logic gates.
8. Realization of Universal Register using JK flip-flops & logic gates.
9. Realization of Universal Register using multiplexer & flip-flops.
10. Construction of Adder circuit using Shift Register & full Adder.
11. Realization of Asynchronous Up/Down counter.
12. Realization of Synchronous Up/Down counter.
13. Design of Sequential Counter with irregular sequences.
14. Realization of Ring counter & Johnson's counter.
15. Construction of adder circuit using Shift Register & full Adder.

Applied Electronics & Instrumentation Engg (Old)

Electronic Measurements and Instrumentation Lab

Code: EI 492

Contacts: 3P

Credits: 2

1. Study of static characteristics (accuracy, precision, hysteresis, repeatability, linearity) of a measuring instrument.
2. Study of dynamic characteristic (fidelity, speed of response)
3. Acquaintance with basic structure of DMM and measurement of different electrical parameters
4. Statistical analysis of errors in measurement using computer simulation
5. Study of A/D converter along with its associate circuitry
6. Study of D/A converter
7. Realization of Data Acquisition system
8. Wave and spectrum analysis using Q meter
9. Measurement of HF and VHF

TRANSDUCER & SENSORS LAB

EI 491

Contacts: 3 P

Credit: 2

1. Study of two Channel Voltage to Circuit transmitter (V-I Transmitter)
2. Study of two Channel I-V Receiver (Converter).
3. Temperature measurement using AD590 Semiconductor temperature sensor.
4. Displacement measurement by Capacitive Transducer.
5. Pressure & Displacement measurement by Linear Variable Displacement Transducer (LVDT).
6. Study of load cell. (To study the load cell behavior for tensile & compressive load).
7. Torque measurements by Strain Gauge Transducer.
8. Measurement of linear displacement using Inductive Displacement Transducer.
9. Measurement of speed using Magnetic Pick-Up Proximity Sensor.
10. Relative Humidity measurement using Capacitive Transducer.
11. Displacement measurement by Magnetic Bi-Polar Digital Position Sensor (using Hall Effect).
12. Measurement of angular speed by Stroboscope.
13. Studies of L.D.R
14. Studies of Photo Diodes & Photo Voltaic cells.

TECHNICAL REPORT WRITING & / LANGUAGE PRACTICE LABORATORY

Code: HU 481

Contact: 3

Credits: 2

Topics to be covered and number of hours required for it:

1. Introductory lecture is to be given to the students so that they get a clear idea of the syllabus and understand the need for having such a practice lab in the first place (3 hours)
2. Conversion practice is done on given situation topics. The students are also made to listen to pre-recorded cassettes produced by British Council and also by the Universities of Oxford and Cambridge (6 hours)
3. Group Discussions:- The students are made to understand the difference between the language of conversion and group discussion. Strategies of such discussions are to teach to them. It is also helpful to use videocassettes produced by the U.G.C. on topics like group-discussion. After wards the class is divided into groups and the students have to discuss on given topics on current socio-economic-political-educational importance(12 hours)

Applied Electronics & Instrumentation Engg (Old)

4. Interview sessions-students are taught the do's and don'ts of facing a successful interview. They then have to face rigorous practices of mock-interviews. There simulations of real life interview sessions where students have to face an interview panel (12 hours)
5. Presentations: The secrets of an effective presentation are taught to the students. Then each and every student has to make lab presentations with the help of the Overhead projector/ using power point presentation and other audio-visual aids in the laboratory. They also have to face the question answer sessions at the end of their presentation (12 hours)
6. Classes are also allotted to prepare the students for competitive examinations like the T.O.E.F.L. by making the students listen to specially produced C.D. cassettes of such examinations (3 hours)

The overall aim of this course is to inculcate a sense of confidence in the students and help them to become good communicators in their social as well as professional lives.

Text:

1. Sharma—Business Correspondence & Report Writing, TMH
2. Prasad—Group Discussion & Interview (With Audio Cassette) , TMH

Reference:

1. Sashi Kumar—Spoken English (with Cassette) , TMH

INDUSTRIAL INSTRUMENTATION

Code : EI 501

Contacts: 3L

Credits: 3

Measurement of process parameters:

Pressure measurement: –manometers, bellows, diaphragms, Bourdon tube design features and calibration; vacuum measurement – McLeod gauge, Pirani gauge, and ionisation gauge.

Flow measurement – Venturi, orifice, pilot tube, rotameter, electromagnetic flow meter, turbine flow meter, ultrasonic flow-meter, hot-wire anemometer, Coriolis mass flow meter.

Temperature measurement- mercury-in glass thermometer, bimetallic, RTD, thermistor, thermocouple.

Level measurement – Float, Displacer, Diaphragm, DP type, Capacitance type, Radar type, and Resistance type.

Analytical methods of measurement -pH, conductivity, viscosity, density, humidity and moisture.

Industrial gas analysis such as oxygen, carbon dioxide, methane, carbon monoxide Zirconia probe oxygen analyser, paramagnetic oxygen analyzer.

Recorders- Moving coil, Magnetic tape, U-V recorder, X- Y recorder, Digital recorder.

Books:

1. Murty -Transducers & Instrumentation , Dr. S.PHI, Delhi'85.
2. Patranabis D- Principles of Industrial Instrumentation -, TMH.
3. Singh: Industrial Instrumentation and Control, 2/e - TMH
4. Helfric A.P. & Cooper- Modern Electronic Instrumentation & Measurement Technique, N.D. PHI, 92.
5. Clarendon -Instrument transducers – An Introduction to their Performance and Design - Press, 2nd Edn. 1975.
6. Liptak V.G -Instrument Engineers Handbook Vol.I, Clinton Book Co.
7. A. K. Sawhney – A Course in Electrical electronic measurement in instrumentation; Dhanpat Rai & co. (p) Ltd.
8. Bolton: Industrial Control & Instrumentation, Universities Press

Microprocessor and Microcontrollers

Code: EI 502

Contacts: 3L + 1T

Credits:4

Introduction to 8085A CPU architecture-register organization, addressing modes and their features. Software instruction set and Assembly Language Programming. Pin description and features.

Applied Electronics & Instrumentation Engg (Old)

Instruction cycle, machine cycle, Timing diagram.

Hardware Interfacing: Interfacing memory, peripheral chips (IO mapped IO & Memory mapped IO).

Interrupts and DMA.

Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same.

Typical applications of a microprocessor.

16 bit processors: 8086 and architecture, segmented memory has cycles, read/write cycle in min/max mode. Reset operation, wait state, Halt state, Hold state, Lock operation, interrupt processing. Addressing modes and their features. Software instruction set (including specific instructions like string instructions, repeat, segment override, lock prefixes and their use) and Assembly Language programming with the same.

Brief overview of some other microprocessors (eg. 6800 Microprocessor).

References:

1. Microprocessor architecture, programming and applications with 8085/8085A, Wiley eastern Ltd, 1989 by Ramesh S. Gaonkar.
2. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communication, Wiley inter science publications, 1980.
3. An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New Delhi by Adam Osborne and J. Kane
4. Advanced Microprocessors by Ray and Bhurchandi - TMH
5. Intel Corp. Micro Controller Handbook – Intel Publications, 1994.
6. Microprocessors and Interfacing by Douglas V. Hall, McGraw Hill International Ed. 1992
7. Assembly Language Programming the IBM PC by Alan R. Miller, Subex Inc, 1987
8. The Intel Microprocessors: 8086/8088, 80186, 80286, 80386 & 80486, Bary B. Brey, Prentice Hall, India 1996.

OPTO-ELECTRONICS AND INSTRUMENTS

Code : EI 503

Contacts: 3L

Credits: 3

Characteristics of optical emission, electro-luminescence.

LED: Power and efficiency calculation, Structure of LED and its characteristics, Heterojunction LED.

External Photo effects- Photo diode: PIN diode, shottky-barrier diode, hetero junction diode, Avalanche Photo diode, Phototransistor.

Opto couplers and their applications in analogue and digital devices.

Optical fibre - modes in optical fibres, step index and graded index fibres, grin lenses, fibre coupling, fibre optic sensors for Industrial applications displacement, pressure, acceleration, force, velocity and flow sensors, fibre optic current and voltage sensors.

Characteristics of laser radiation, structure of gas and solid-state lasers, pulse mode laser, Q-switched laser, semiconductor laser, Holographic data systems, memories and read out, optical data processing fundamentals.

Books:

1. Wilson Halokes - Optoelectronics –An introduction, PHI,
2. Bhattacharjee P. - Semiconductor Optoelectronics, PHI,
3. Culshaw B. and Dakin J(Ed) - Optical Fibre Sensors, Vol.1.2 Artech House, 1989.
4. Selvarajan -Opto Electronics IETE – Vol. 5 TMH.
5. Chin-Lin-Chon -Elements of Optoelectronic & Fibre Option, MGH
6. Sarkar C.K.: Optoelectronics & Fibre Optics Communication, New Age International

Applied Electronics & Instrumentation Engg (Old)

7. Pal B.P.: Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, New Age International
8. Mukunda Rao: Optical Communication, Universities Press

COMMUNICATION THEORY

Code : EC 511

Contacts: 3L + 1T (3 + 1 + 0)

Credits: 4

Basic concepts: Ampere's, Faraday's and Gauss's law, Maxwell's equations, displacement current equation of continuity, Laplace's and Poisson's equation. Propagation of plane waves.

Linear modulations – AM, DSB, SSB and VSB. Envelope and synchronous detection. Carrier recovery-different loops e.g. PLL etc. Circuits to generate linear modulated signals. Low and high power modulators.

Exponential modulation. Frequency and phase modulations. Generation of FM & PM. Radio receivers-superheterodyne principle. AGC. Elements of antenna technology, wave guide and microwave technology.

Noise sources and their characteristics-noise temperature, noise figure and bandwidth. SNR performance of AM, PM, FM and pulse modulation.

Digital Modulation: ASK , FSK, PSK performance evaluation, Time division multiplexing and demultiplexing, Modems, Error control and coding .

Data transmission, Synchronization, Data protection, error detection and correlation.

Books :

1. G. Kennedy -Electronic Communication System , TMH
2. Lathi B.P., HRT -Modern Digital and Analogue Communications System , Rinhart & Winstory Inc. Int. End.
3. Hancock – An introduction to the Principles of Communication Theory –TMH.
4. Singh& Sapre: Communication Systems: Analog and Digital, TMH
5. Taub and Schilling – Principles of Communication system –TMH
6. Haykin S. - Communication systems –PHI
7. Carlson R.B. – Communication Systems 4 /e, Mc. Graw Hill.

Linear & Digital Control System

EE 511

Contact: 3L + 1T + 0

Credit: 4

Elementary control concepts. Open loop and close loop control

Transfer function of simple electrical and electromechanical systems. Poles and zeros.

Transient response of 1st and second order systems. Modelling Position Control and Velocity control systems.

Case studies of positional control systems: Servo Motor, Tacho, Potentiometer Characteristics.

Frequency response. Bode & Nyquist Diagram. Root Locus, Stability analysis. Routh Hurwitz Criteria, Nyquist Criteria. Gain margin & phase margin. Signal flow Graph, Masson's Gain formula.

Control Actions: P, PD, PI & PID Control.

Introduction to state variable modelling. Z transforms and discrete data systems.

Text books :

1. Madan Gopal—Control Systems , Principles & Application , 2/e ,TMH
2. Nagrath I. J. and Gopal M., "Control Systems Engineering", 3rd Edn., New Age International (P) Ltd.
3. Ogata K, "Modern Control Systems", 2nd Edn., Prentice Hall, Englewood Cliffs.
4. Benjamin C. Kuo, "Automatic Control Systems", 7th Edn., PHI
5. Chandna: Control System, CyberTech
6. Gopal: Modern Control System, New Age International
7. Gopal: Digital Control Engineering, New Age International
8. Mahapatra: Industrial Control & Instrumentation, Universities Press

References :

1. Ogata K., "Discrete - Time Control Systems", Prentice Hall, Englewood Cliffs, N. J.
2. Dasgupta S. K., "Control Systems"

Applied Electronics & Instrumentation Engg (Old)

3. Maheshwari: Laboratory Manual for Introductory Electronic Experiments, New Age International

INDUSTRIAL INSTRUMENTATION LAB

Code : EI 591

Contacts: 3P (0 + 0 + 3)

Credits: 2

Experimentation on:

1. Calibration of pressure gauge by Dead weight tester.
2. Measurement of Temperature by using Thermocouple.
3. Study of RTD characteristics & use in temperature sensitive bridge.
4. Measurement of Velocity of flow of water by head type flow meter.
5. Measurement of velocity of flow of Water by variable area type flow meter.
6. Measurement of level using capacitive type sensor.
7. Measurement of moisture using moisture balance.
8. Measurement of Viscosity.

Microprocessor and Micro-controller Lab

Code: EI 592

Contacts: 3P

Credits: 2

Sl. No.	<u>Name of the Experiments</u>	<u>No. of hours</u>
1.	Familiarization with 8085 register level architecture and trainer kit components, including the memory map. Familiarization with the process of storing and viewing the contents of memory as well as registers.	3
2.	a) Study of prewritten programs on trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical) b) Assignments based on above.	3
3.	a) Familiarization with 8085 simulator on PC. c) Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator. b) Assignments based on above	3
4.	<u>Programming using kit/simulator for</u> i) table look up ii) Copying a block of memory iii) Shifting a block of memory iv) Packing and unpacking of BCD numbers v) Addition of BCD numbers vi) Binary to ASCII conversion vii) String Matching viii) Multiplication using Booth's Algorithm	9
5.	<u>Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg. subroutine for delay, reading switch state & glowing LEDs accordingly, finding out the frequency of a pulse train etc</u>	3
6.	<u>Interfacing any 8-bit Latch (eg. 74LS373) with trainer kit as a peripheral mapped output port with absolute address decoding</u>	3
7.	<u>Interfacing with I/O modules:</u> a) ADC b) Speed control of mini DC motor using DAC c) Keyboard d) Multi-digit Display with multiplexing e) Stepper motor	12
8.	<u>Writing programs for 'Wait Loop (busy waiting)' and ISR for vectored interrupts (eg. counting number of pulses within specified time period)</u>	3
9.	<u>Study of 8051 Micro controller kit and writing programs for the following tasks using the kit</u> a) Table look up b) Basic arithmetic and logical operations	6

Applied Electronics & Instrumentation Engg (Old)

c) Interfacing of Keyboard and stepper motor

10. Familiarization with EPROM programming and Erasing

3

Communication Engg. Lab

EC 581

Contacts: 3 P (0 + 0 + 3)

Credits: 2

Experiments on: -

1. Study of Amplitude modulation & Demodulation technique.
2. Study of Double Side Band Suppressed Carrier (DSB-SC) & Demodulation technique.
3. Study of Single Side Band Suppressed Carrier (SSB-SC) & Demodulation technique.
4. Study of Frequency Modulation & Demodulation.
5. Study of Time Division Multiplexing (TDM) & Demultiplexing.
6. Study of Frequency Shift Keying (FSK).
7. Study of Pulse Amplitude Modulation (PAM).
8. Study of Pulse Width Modulation (PWM).
9. Study of VCO (Voltage controlled oscillator) & PLL (Phase Locked Loop).

Linear & Digital Control System Lab

EE 581

Contacts: 3 P (0 + 0 + 3)

Credits: 2

Experiments on: -

1. Familiarization with MATLAB- Control system toolbox, MATLAB-SIMULINK toolbox & PSPICE.
 2. Determination of step response for First order & Second order System with unity feedback on CRO & calculation of control system specifications for variation of system design.
 3. Simulation of step response & impulse response, for Type-0, Type-1 & Type-2 system with unity feedback using MATLAB & PSPICE.
 4. Determination of root-locus, Bode-plot, Nyquist plot, using MATLAB-Control system toolbox for a given 2nd order transfers function & determination of different control system specifications.
 5. Determination of PI, PD, PID controller action on 1st order simulated process.
- Determination of approximate transfer function experimentally using from Bode Plot.

Applied Electronics & Instrumentation Engg (Old)

Process Control

Code : EI 601
Contacts : 3L
Credits : 3

General Review of Process, Process Control and Automation.

Different Process Variables for process control with case studies, Characteristic parameters of a typical process plant, a self regulation, potential value, process reaction rate, process time lag, process resistance and capacitance etc.

Characteristics and functions of different modes of control actions – ON-OFF, Multistep, P, PI, PD, PID.

Generation of Control Action in pneumatic & electronic controller, construction of different controllers.

Tuning of Controller – open loop & closed loop methods.

Different control techniques e.g. feedback, feedforward, ratio, cascade, override, batch and continuous process control, multi variable control schemes, adaptive control.

Final Control Element – different types of actuators (pneumatic, hydraulic, electric motor & stepper motor type),

Control Valves, valves positioner, trim of control action, valve characteristics, single & double seated valve, special type of control valves – gate valve, butterfly valve etc.

Advanced control strategies – microprocessor based control, PLC, DDC, Introduction of DCS

Conversion of existing control schemes in operating plants with a complete example.

Transmitters – pneumatic, electronic (analog and SMART)

References:

1. Harriot – Process Control, TMH
2. Johnson – Process Control Instrumentation Technology, - Pearson Education/PHI
3. Luyben W. L – Simulation & Control for Chemical Engg.
4. Stephanopoulos G – Chemical Process Control – An Introduction to theory & Practice, PHI
5. Considine Douglas M – Process /Industrial Instruments and Control Handbook, MH
6. Bequette – Process Control – Modeling, Design and Simulation, PHI
7. Patranabis – Principles of Process Control, TMH
8. Patrick, Industrial Process Control Systems, Vikas

Microprocessor Based System

Code : EI 602
Contacts : 3L
Credits : 3

INTRODUCTION

Block Diagram of a typical microprocessor based system pointing out the role of microprocessor and other peripheral blocks.

MICROPROCESSOR

Review: Intel 8086/8088 Microprocessor: Architecture, Clock Generator, Resetting the microprocessor, Wait State Inserting, Bus Buffering, Interrupts, and Assembly Language Programming.

ADDING MEMORY

Classification, Memory Timing, Interfacing requirements, Interfacing Slow Memory, Interfacing Static RAM (6116 – 2K, 6264 – 8K), Interfacing EPROM (2764 – 8K, 27256 – 32K), Address decoding (using logic gates and decoders, using PAL), Designing Memory Modules (higher capacity say 512K) using memory chips (say 8K), Interfacing Memory Modules to the microprocessor, Interfacing Dynamic RAM, Non Volatile Memories

ADDING INPUT/ OUTPUT DEVICES

Applied Electronics & Instrumentation Engg (Old)

Designing an 8-bit input port, Designing an 8-bit output port, I/O space, Address decoding for Memory mapped I/O and I/O mapped I/O

Review: I/O Controllers – 8255A, 8250/1, 8279, 8253/4, 8259A, 8237A

Interfacing of Digital I/O Devices: Handshaking Logic, Programmed I/O, Interrupt driven I/O, Direct memory access, High Power Device Interfacing – Wave shaping, Driving and level shifting, Isolation

Examples: Interfacing and assembly language monitor program for Key Board (one dimensional, two dimensional) through 8255A and 8279, Centronics-type Parallel Printer through 8255A, Display (7-segment, dot-matrix, alphanumeric) through 8255A and 8279, Data Transfer between two microprocessor based systems through 8255As, Mechanical and solid state Relays, Stepper Motor etc.

Analog Interfacing and Industrial Control: Review of Operational amplifier characteristics and circuits, Sensors and transducers (light sensors, temperature sensors, Force and pressure transducers, etc.), signal conditioning – multiplexing, linearization and scaling, 4-20 mA current loop

Examples: Interfacing and assembly language monitor program for D/A Converter (MC1408 8-bit D/A, DAC 1208 12-bit D/A etc.), A/D Converter (ADC0808 8-bit ADC, ICL7109 12-bit ADC etc.)

ADDING TOGETHER

Designing microprocessor based systems with monitor programs for single/ multipoint Temperature Monitoring, Data Logger, PID Controller, etc.

EMBEDED CONTROLLER

Intel 8051 embedded controller – Architecture and Assembly language programming, system design using 8051

COMMUNICATING WITH OTHERS

Asynchronous serial data communication, Serial Data transmission methods and standards, RS-232C Serial Data Standard (Rs-232C to TTL interfacing, RS-232C signal definitions, Connection), Modems

References:

1. Douglas V. Hall – Microprocessors & Interfacing, Tata McGraw-Hill
2. Mohamed Rafiqzaman – Microprocessors and Microcomputer based system Design, PHI
3. Muhammad Ali Mazidi – The 8051 Microcontroller and embedded systems, Pearson Ed. Asia
4. Ray & Bhurchandi, Advanced Microprocessors & Peripherals, TMH
5. Predko, Programming & Customising 8051 Microcontroller, TMH
6. John Uffenbeck – Microcomputers and Microprocessors, PHI/ Pearson Education
7. Chowdhury & Chowdhury, Microprocessor & Peripherals, Scitech
8. Thyagarajan, Microprocessor & Microcontrollers, Scitech
9. Michel Slater – Microprocessor Based Design, PHI
10. Walter A. Tribel – The 8088 and 8086 Microprocessors, PHI
11. Barry B. Brey – The Intel Microprocessors, PHI/Pearson Ed. Asia
12. Mathivanan, Microprocessors PC Hardware & Interfacing, PHI

Digital Signal Processing

Code: EC 611

Contacts : 3L + 1T

Credits : 4

Introduction: Discrete and continuous time signals and systems. Data acquisition and conversion including multi-channel data converter and monitors. Stability, linearity and causality of linear shift in variant signal transmission and processing. Review of 2 transformation.

DFS: Its properties, Fourier representation of finite duration sequences.

DFT: Representation of periodic sequence computational algorithms.

Fast Fourier Transformation (FFT): Computational considerations. Digital Filters: Structures, different forms, finite impulse response (FIR) and infinite impulse response (IIR). Flow graph representation of digital filter. Digital filter design: IIR Filter design by impulse invariant and bilinear transformation. FIR filters design using windows and frequency sampling method. Effect of finite register length in DSP and effect of quantization of filter parameters in the filter design.

Computer control of processes – supervisory and direct digital control. Simple filter design using MATLAB.

Introduction to DSP hardware: Architectural features, Fixed point processors, floating point processors.

Control and Instrumentation application – telemetry and meeting

Applied Electronics & Instrumentation Engg (Old)

References:

1. Mitra S – Digital Signal Processing – A computer based approach, TMH
2. Iefeachor, Digital Signal Processing, Pearson Education
3. Proakis J.C & Manslakis M G – Digital Signal Processing: Principles, Algorithm and Applications, PHI/ Pearson Education
4. Salivahanan S, Vallavaris A, Gnanpruja C – Digital Signal Processing, TMH
5. Chen, Digital Signal Processing, OUP
6. Babu Ramesh, Digital Signal Processing, Scitech
7. Ingle, Digital Signal Processing Using MATLAB, Vikas
8. Oppenheim A V & Shaffer R W – Digital Signal Processing, PHI/ Pearson Education
9. Oppenheim A V & Shaffer R W – Discrete Time Signal Processing, PHI/ Pearson Education
10. Johnson J R – Digital Signal Processing, PHI, EE
11. Rabiner L R & Gold B – Theory and Applications of Digital Signal Processing, PHI

Power Electronics

Code : EE 604

Contacts : 3L + 1T

Credits : 4

Power semiconductor devices: PNP diodes, DIACS Thyristors, TRIACS, GTO devices, Power Transistors, Power MOSFET. Rating, losses and cooling. Triggering circuits for SCRs, UJT. Blocking Oscillators, Schmitt trigger circuits – Power MOS gate drive circuits.

Uncontrolled and controlled rectifiers: single phase and poly phase, Bridge rectifiers, Transformer ratings, Inductive load, free wheeling diodes.

Converter operation: Overlap, power factor, inversion, regulation, P-pulse converters, power factor control via PWM converters

DC line commutation: Series and parallel capacitor turn off, impulse commutation.

Frequency Conversion: Cycloconverter single and three phase circuit, blocked group operation, circulating current mode, Single phase and three phase inverters, constant voltage source and constant current source inverters, HF inverters for heating.

Application: DC and AC Drives, SMPS, Resonant Converters, AC line Filters, Radio Interference suppression, HDVC Transmission.

References:

1. Sen P C – Power Electronics, TMH
2. Sen P C – Modern Power Electronics, S.Chand
3. Rashid M H – Power Electronics, PHI/ Pearson Education
4. Krein, Elements of Power Electronics, OUP
5. Lander C W – Power Electronics, 3rd Ed., MH
6. Rammurthy M – An Introduction to Thyristors and their applications
7. B.K Bose, Modern Power Electronics, Jaico
8. Jacob, Power Electronics, Vikas
9. HariBabu, Power Electronics, Scitech
10. Dubey S K – Thyristorized Power Controller, John Wiley & Sons
11. Singh M D & Khanchandni – Power Electronics, TMH
12. Dewan S B & Stranghen A – Power Semiconductors Circuit
13. Mohan N, Underland T M & Robbins W P – Power Electronics, John Wiley & Sons
14. Dubey G K – Thyristorized Power Controllers, New Age International
15. Subramanyam – Power Electronics, New Age International
16. Sugandhi – Thyristors: Theory & Applications, New Age International

Computer Network & Internetworking

Applied Electronics & Instrumentation Engg (Old)

Code : CS 611
Contacts : 3L
Credits : 3

Introduction to computer networks: What it is; advantage of; structure of communication network; point-to-point, circuit switched, packet switched; network topologies; network protocols; OSI reference model, example networks; physical layer and data transmission – analog and digital; transmission impairments; delay, distortion; transmission media; twisted pair, co-axial, optical fibre, terrestrial microwave, satellite microwave, radio; data encoding and communication: recap on PCM; AM; asynchronous and synchronous transmission; error detection techniques; interfacing: RS-232C, X.21 Digital interface; modems, multiplexer, demultiplexer.

Media access control and data link layer – framing; error detection and correlation methods; stop-and-wait ARQ; Back-N ARQ; Selective Repeat ARQ etc; media access protocols: ALOHA, slotted ALOHA, CSMA/CD, Token Ring, Token Bus, FDDI-I, FDDI-II, ATM.

Network layer – connection oriented vs. connectionless services; routing; X2.5; IP; congestion control, internetworking, network layer in the Internet; IP protocol, IP addresses, subnets, OSPF, BGP, CIDR; network layer in ATM.

Transport layer – transport services and protocols; the Internet transport protocols; TCP and UDP, Remote procedure call, ATM AAL layer protocols.

Application layer – network security, DNS, SNMP, FTP, Telnet, E-mail, X-400, digital networks-ISDN; B-ISDN

Text Books:

1. Forouzan, Data Communication & Networking, (3rd Edition), TMH
2. A S Tanenbaum – Computer networks, Prentice Hall of India, 3rd Ed/ Pearson Education.
3. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
4. Black, Data Communication & Networking, PHI
5. Zeimer & Tarnter, Principles of Communication, Jaico
6. Miller, Data Communication & Network, Vikas
7. Mansfield, An introduction to Computer Networking, PHI

References:

1. Black Ulyess – Computer Network Protocols, Standards and Interfaces, PHI
2. J A Stankovic – A perspective on Distributed Computer System, IEEE Trans. Computer
3. S. Mullender – Distributed Systems, Pearson Education
4. Paul E Green – Computer Network Architectures and Protocols, Plenum Press, New York, 1982
5. P. R Green – Protocol Conversion, IEEE Trans Communication
6. Stallings William – Data and Computer Communication, PHI/ Pearson Education
- 7.

Process Control Laboratory

Code : EI 691
Contacts : 3P
Credits : 2

1. Study of a typical Temperature Control Loop having Furnace, suitable final control element, SMART/Analog temperature transmitter (hand held communicator for SMART Transmitter), PID controller, and data logger etc.
2. Study of a typical Pressure Control Loop having Pressure source, Pneumatic control valve, I to P Converter, Compressor, SMART/Analog pressure transmitter, and PID controller etc.
3. Study of a typical Flow Control Loop having SMART/Analog DP/Mass Flow meter, Motorized / Pneumatic control valve (I to P Converter and Compressor for pneumatic control valve), and PID controller etc.
4. Study of a typical Level Control Loop having Ultra Sonic/ Capacitor Level Transmitter, Motorized / Pneumatic control valve (I to P Converter and Compressor for pneumatic control valve), and PID controller etc.
5. Study of a typical Duct Air Flow monitoring and Control.
6. PLC Programming through PC
7. Study of a PC based Simulation Software i.e. simulation of boiler of a power plant etc.
8. Study of flow/temperature control loop with DCS

Note:

All the experimental set-ups having SMART transmitters do not require separate hand held communicator.

Applied Electronics & Instrumentation Engg (Old)

Microprocessor Based Systems Laboratory

Code : EI 692

Contacts : 3P

Credits : 2

List of Experiments:

11. Familiarization with 8086/88 register level architecture and trainer kit components, including the memory map. Familiarization with the process of storing and viewing the contents of memory as well as registers. 3 Hrs.
12. d) Study of prewritten programs on trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical) 3 Hrs.
e) Assignments based on above.
13. c) Familiarization with 8086/88 simulator on PC. 3 Hrs.
f) Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator.
d) Assignments based on above
14. **Programming using kit/simulator for** 9 Hrs.
ix) table look up
x) Copying a block of memory
xi) Shifting a block of memory
xii) Packing and unpacking of BCD numbers
xiii) Addition of BCD numbers
xiv) Binary to ASCII conversion
xv) String Matching
xvi) Sorting etc.
15. **Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg, subroutine for delay, reading switch state & glowing LEDs accordingly, finding out the frequency of a pulse train etc** 3 Hrs.
16. **Interfacing with I/O modules:** 15 Hrs.
f) ADC
g) Speed control of mini DC motor using DAC
h) Temperature sensor and display temperature
i) Relay
j) Keyboard through 8279 and 8255A
k) Multi-digit Display with multiplexing through 8255A & 8279
l) Stepper motor
17. **Writing programs for 'Wait Loop (busy waiting)' and ISR for vectored interrupts (eg, counting number of pulses within specified time period)** 3 Hrs.
18. **Familiarization with EPROM programming and Erasing** 3 Hrs.

Power Electronics Laboratory

Code : EE 684

Contacts : 3P

Credit : 2

List of Experiments:

1. Study of V-I Characteristics of an SCR
2. Study of V-I Characteristics of a TRIAC
3. Study of different Triggering Circuits for Thyristor
4. Study of Uni Junction Transistor (UJT) Triggering Circuit
5. Study of a firing Circuit suitable for single phase half controlled Converter
6. Simulation of a Single Phase AC-DC Uncontrolled Converter with & without source inductance
7. Simulation of a single phase AC to controlled DC Converter with and without source inductance
8. Single Phase half controlled Bridge Converter with two Thyristors and two Diodes
9. Single Phase fully controlled Bridge Converter using four Thyristors
10. PSPICE Simulation of DC to DC step down chopper
11. PSPICE Simulation of single phase controller with R-L Load

Applied Electronics & Instrumentation Engg (Old)

12. PSPICE Simulation of PWM Bridge Inverter of R-L Load using MOFET

Computer Network and Internetworking Laboratory

Code : CS 681

Contacts : 3P

Credits : 2

Experiments are based on Linux / Unix / Solaris (Text Mode) Operating System

1. Familiarization of NIC, different cabling options (e.g. UTP, Coaxial, optical fibre), Connectors – BNC, RJ45, RS-232C, Interconnecting Devices – Hub, switch, router etc., Preparation of some UTP cables with RJ45 connectors and setting up a small network using either Hub or switch.
2. Configuring NIC, preparing routing table, assignment of IP address & net mask to each machine, concept of subnet, CIDR, socket interface
3. Configuring PPP
4. Configuring DNS server (e.g. Bind)
5. Configuring web server (e.g. Apache)
6. Configuring mail server (e.g. Postfix, Qmail etc.)
7. Configuring Telnet, FTP server
8. Configuring Firewall (e.g. IP chains, IP tables etc. in Linux)
9. Configuring NFS & NIS
10. C program to implement a simple client
11. C program to implement a simple server (e.g. echo)
12. Concurrent server using process
13. Concurrent server using thread (Linux, Windows)
14. C program to compute checksum
15. C program to implement stop-and-wait ARQ
16. C program to implement GO-back-n ARQ
17. C program to implement selective repeat ARQ

Symbols:

NIC – Network Interface Card

UTP – Unshielded Twisted Pair

CIDR – Classless Inter Domain Routing

PPP – Point to Point Protocol

DNS – Domain Name Server

FTP – File Transfer Protocol

NFS – Network File System

NIS – Network Information System

ARQ – Automatic Repeat reQuest

Seventh Semester

Remote Control & Telemetry

Code : EI 701

Contacts : 3L

Credits : 3

Introduction: Classification of Telemetry Systems – voltage, current, position, frequency, and time. Components of Telemetry and Remote Control Systems. Quantization theory – sampling theorem, sample and hold, data conversion – coding.

Multiplexing – Frequency Division Multiplexing with constant bandwidth and proportional bandwidth, demultiplexing; Time division multiplexers, demultiplexers – theory and circuits, scanning procedure, Pulse Code Modulation (PCM) Technique.

Data acquisition and distribution system. Fundamentals of audio and radio telemetry systems. Digital Modulation and demodulation Techniques in Telemetry Systems. Standard for telemetry e.g. IRIG etc. Microwave links. Practical Telemetry Systems – Pipe line telemetry, power system telemetry, supervisory telecontrol systems. Introduction to ISDN.

References:

Applied Electronics & Instrumentation Engg (Old)

9. Swobada G – Telecontrol Method and Application of Telemetry and Remote Control, Von Nostrand, 1971.
10. Schwartz M – Information Transmission – Modulation & Noise, MGH, 1970.
11. Gruenberg E L – Handbook of Telemetry and Telecontrol, MGH, 67
12. Carley B A – Communication System
13. Patranabis P – Telemetry Principles, TMH

Financial Management and Accounts

Code : HU 701
Contacts : 3L
Credits : 3
Allotted Hrs: 45L

Introduction [3L]

Financial Management, Financial Planning and Capitalization- definitions, objectives, changing roles and functions, Financial Decision.

Capital Budgeting [7L]

Nature of Investment decision, Importance of Capital Budgeting, The Capital. Budgeting Process - Investment Criterion, Pay-back period, Accounting, ROR (Rate of Return) Method, Discounting Cash flow method, Net - present value method, IRR (Internal Rate of Return) method, The benefit-Cost Ratio method.

Management of Working Capital [7L]

Various concepts, Elements, Classification, Financing and importance of working capital, Investment analysis, Cash flow determination, cost of capital, capital budgeting methods.

Budgeting Control Technique [5L]

Concepts of Budget, budgeting and budgetary control, Objectives, Functions, Uses, Advantages, Limitations; Master Budget and Report.

Cost - Volume - Profit Analysis [8L]

Classification of costs, Allocation, apportionment and absorption, Cost centers, different costing systems, Cost analysis for managerial decisions, Meaning of Linear CVP analysis, Objectives, Assumptions, Break - Even analysis, determining the Break-Even point profit, Volume graph profit, Volume ratios margin of Safety.

Introduction to Accounting [8L]

Basic accounting concepts, important definitions, uses, limitations, advantages; types of Accounting, Financial statements, introduction to Journal Accounting; different types of Vouchers, double entry bookkeeping, different types of transactions related to Financial Accounting.

Financial Control [7L]

Posting of Ledgers and preparation of Trial Balance; preparation of Balance Sheet and Profit and Loss Accounts; Controlling other departments by Financial Accounting (A practical Approach).

Books:

1. Financial Management and Accounting - P. K. Jain, S. Chand & Co.
2. Management & Accounting: Principles and Practice - R. K. Sharma & Shashi Kumar Gupta, Kalyani Publishers.
3. Advanced Management Accounting - Kaplan & Atkinson, PHI.
4. Fundamentals of Financial Management - Van Home, PE.
5. Financial Mgmt Accounting, Gupta, Pearson
6. Financial Mgmt, I.M. Pandey, Vikas
7. Financial Mgmt., Khan & Jain, TMH
8. Financial Mgmt , Mmenamin, OUP
9. Financial Mgmt & Policy, Van Horne, PHI
10. Financial Mgmt, Kulkarni & Satyaprasad, Himalaya

Multimedia Systems

Code : IT-711
Contacts : 3L
Credits : 3

Introduction to Multimedia: Overview, Importance, Components, Uses of multimedia, Future Hypertext and hypermedia, different media and channels and modes of communication.

Multimedia Resources: Data rate, cost effectiveness and production time considerations, Analog and digital representations, Image, Video and Audio Standards, Colour space and models, communication standards - ISDN, ATM

Applied Electronics & Instrumentation Engg (Old)

Equipment and devices: Display screen, storage devices, communication and interactive peripherals.

Test: Attributes and guidelines, Text markup, HTML, models of hypertext document, XML

Digital Graphics: Vector and raster graphics, Graphics file formats, image manipulation.

Audio: Digital audio, MIDI, Processing sound, sampling, compression.

Video: MPEG Compression standards, Compression through Spatial and Temporal Redundancy, inter-frame and intra-frame Compression.

Animation: Types, techniques, key frame animation, utility, Morphing

Compression techniques: Lossless and lossy compression, Simple compression techniques Interpolative, Predictive, Transform Coding, Discrete Cosine Transform, Statistical Coding - Huffman encoding. JPEG, MPEG

Design and development of multimedia: Tools to support multimedia development, Authoring Multimedia - different type of authoring environments, Media synchronization, Design process, development team Evaluation and Testing - Gagne events, Project management.

Human Computer Interaction (HCI): Objective, norms and guidelines, Shneiderman's rules for design, Norman's seven stages of action, Interaction Design & Notations - Meta notations and state transition graphs, Screen design norms and guidelines.

Multimedia information management application: Multimedia database and design consideration.

Intellectual property: Foundations of intellectual property, copyrights, issues regarding the use of intellectual property.

Future developments: Virtual reality, newer devices, performance support, knowledge management, interactive interfaces

Text Books:

1. Ben Shneiderman - "Designing the User Interface", Addison Wesley Longman Publishing Co. (ISBN:0-201-69497-2)
2. Jakob Nielsen - "Hypertext and hypermedia", Boston, Academic Press, 1990
3. Arch C Luther - "Design interactive multimedia", Bantam Books, NY, 1992

References:

1. D Norman - "Design of Everyday Things" - M.I.T. Press, 1998. (ISBN 0-262-64037-6)
2. Jeff Burger - "Multimedia for decision makers: a business primer", Addison - Wesley, 1995, Reading, Mass
3. Chapman, N. and Chapman J. - "Digital multimedia", John Wiley, 2000
4. Elsom Cook - "Principles of Interactive Multimedia", McGraw Hill, 2001, ISBN 007-709610 x
5. Buford, J. K., - "Multimedia Systems", Pearson Education Asia, 2000
6. Vannevar Bush (Foundation Paper) - "As we may think"
7. Hillman – Multimedia Technology & Applications, Galgotia Publications
8. Bunzel – Multimedia Applications & Development, MGH Pub.

Remote Control & Telemetry Laboratory

Code : EI 791

Contacts : 3P

Credits : 2

1. Study of a voltage telemetry system using a practical transducer
2. Study of 4-20 mA Current telemetry system (2 wire, 3 wire, 4 wire)
3. Study of frequency telemetry system using VCO and phase sensitive detector
4. Study of a Frequency Division Multiplexing and demultiplexing, 2 to 4 channels using wire as transmission channel
5. Study of pulse code modulation system
6. Study of phase locked loop as a detector
7. Study of the characteristics feature of a sample control system
8. Study of a software based data acquisition system

Multimedia System Laboratory

Code : IT-781

Applied Electronics & Instrumentation Engg (Old)

Contacts : 3P
Credits : 2

1. Web document creation using Dreamweaver (6P)
2. Image manipulation and editing with Photoshop (6P)
3. Audio recording and editing (3P)
4. Creating animation using Flash (9P)
5. Individual Project: Development of personal web page and documentation (6P)
6. Main Project: Group project, complete design documents, implementation of an application (15P).

Non-Destructive Testing

Code : EI 702 (a)
Contacts: 3L
Credits : 3

Introduction and importance of NDT. General Principles and Basic Elements of NDT. Liquid Penetrant Method, Magnetic and Electromagnetic Methods, Optical Method (Laser Holography), Thermography, Ultrasonic Testing Methods, Radiological Methods – X-Ray, Gamma Ray, Tomography.

References:

1. Mclutive p (Ed) – NDT Handbook, American Society for NDT, 1989.
2. Hull B and John V – Non Destructive Testing, FI BS/McMillan.

Wireless & Mobile Communication

Code : EI 702 (b)
Contacts: 3L
Credits : 3

Introduction : HF, VHF, UHF and MW propagation. Modulators, demodulators, Multiple access schemes, FDMA, TDMA and CDMA, packet radio, radio telephony; spectrum efficiency; cellular communication system, AMPS system switching and networking. PCS services. Indoor and outdoor urban propagation models, pagers, GSM, GPRS, IS-95 systems. Cordless telephony, PCN, mobile computing, Introduction to wireless LAN: Mobile satellite communication; Wireless Access Protocol, Generation of mobile communication – 3G systems.

References:

1. Mobile Cellular Telecommunications – Analog and Digital System (1995)
2. Wireless Communications and Networks – 2nd edition by William C.Y. Lee MGH
3. Wireless Communication – Principles & Practice – Rappaport – Pearson
4. Mobile Communications – Schiller – Pearson
5. Wireless Network Evolution : 2G to 3G – Garg – Pearson.

Advanced Microprocessor

Code : EI 702 (c)
Contacts: 3L
Credits : 3

Evolution of Computer organization; design methodology – Register and processor level; Processor design organization, Instruction formats, Arithmetic operation; Control design: Hardware control, Micro-programmed control; Memory organization, Addressing schemes for main memory, virtual memory, high speed memory, Memory interfacing, Input-output systems, Interrupt handling. Organisation of 8 bit, 16 bit and 32 bit microprocessors, Bit slice architecture, Assembly language programming; study of special peripheral ICs, Interfacing with microprocessors; case study on microprocessor applications.

References:

1. Transputer Development System - Inmos Ltd., PH 1988
2. 16/32 Bit Microprocessors 68000/68010/68021, Software, Hardware & Design Applications - W V Subbarao, Macmillan Pub Co.

Applied Electronics & Instrumentation Engg (Old)

3. Advanced Microprocessors - D Tabak, MGH 1995
4. The 8088 and 8086 Microprocessors Programming, interfacing, software and Hardware application - Triebel & Singh, PHI
5. Intel Microprocessors - The 8086/8088/80186/80286/80386, 80486 Pentium Pro-Processor; Architecture, Programming & interfacing - Brey, PHI
6. The Pentium Microprocessors: Autonakos, Pearson
7. Advanced Computer Architecture: Sima, Pearson

VHDL and Gated Arrays

Code : EI 702 (d)
Contacts: 3L
Credits : 3

Hardware Description Languages :

Overview of VHDL & VERILOG; Design at different levels with special emphasis on Gate Level design (Gate Array); Design of Sequential, Combinational and Memory devices; Logic level design and synthesis - Optimisation methods; Information about SUPREM and other CAD tools.

Process, Device and Circuit Simulation :

Process Simulation - Ion Implantation, Diffusion, Oxidation, Epitaxy, Lithography, Etching, Metallization; Device Simulation - Modeling of Bipolar and MOS Transistor, Information about BIPOL and MONIMOS CAD tools; Circuit Simulation - Linearization methods, Frequency domain analysis, Non-linear DC circuit analyses, Transient analyses of dynamic networks, Optimization and Sensitivity analyses, Automatic Design; Information about PSPICE, ORCAD and other CAD tools.

Design of VLSI Gate Array ICs :

Basic concepts of Gate Array Design-scope of bringing Analog and Digital design together, concepts like Standard Cell, Silicon Compiler etc; Gate Array Technology-Technology conversion, Combination Technology e.g. BIMOS (Bipolar + MOS technology), Silicon on Insulator (SOI), Gas on Si, Programmable aspects of Gate Arrays; CAD for Gate Arrays-Circuit and Logic Simulation, Testing, Fault Analysis, Test Generation, Placement and Routing, CMOS and BIPOLAR Macros, Information about XLINIX and ACTEL Gate Arrays.

References:

1. Bhaskar : A VHDL Primer 3/e. Pearson Education
2. Weste : Principles of CMOS VLSI Design 2/e Pearson Education
3. Yalamanchili : Introductory VHDL, from Simulation to synthesis - Pearson Education
4. Campbell S. A. : The Science and Engineering of Microelectronic fabrication - Oxford University Press.
5. Majumder : Genetic Algorithms of VLSI Design, Layout and test automation, Pearson

Ultrasonic Instrumentation

Code : EI 703 (a)
Contacts: 3L
Credits : 3

Ultrasonic waves, principles and propagation of various waves, Characterization of Ultrasonic transmission - reflection and transmission coefficients, intensity and attenuation of sound beam. Power level, medium parameters. Generation of ultrasonic waves - Magnetostrictive and Piezoelectric effects. Search unit - types construction, characteristics. Ultrasonic test methods - pulse echo, transit time, resonance, direct contact and immersion type. Ultrasonic methods of flaw detection. Ultrasonic method of measuring thickness, depth, flow etc. Variables affecting ultrasonic testing in various applications, Ultrasonic applications in Medical Diagnosis and Therapy, Acoustical holography.

References:

1. Krauthsamer J and Krauthsamer H - Ultrasonic Testing of Materials, Springer Verlag, Berlin, New York.
2. Wells N T - Biomedical ultrasonics, Academic Press, London 1977.

Applied Electronics & Instrumentation Engg (Old)

Advanced Sensors

Code : EI 703 (b)
Contacts: 3L
Credits : 3

Semiconductor sensors : Metal Oxide Semiconductors, Hall Elements. Silicon Sensors: Silicon Planar Technology. Micromachine Technology. Silicon sensors for sensing radiation, mechanical magnetic, chemical and other signals IC sensors : Chemical and Biochemical Sensors : Polymers. Chemically modified electrodes. Membrane. Electrodes. Thick film devices. Catalytic devices. Gas sensors: Optical sensors: Lasers. Photo-detectors and optical fibre as sensors, Integrated Optics: Micro Sensors: Thin film sensors, Micro sensors for sensing thermal, Radiation, Mechanical, Magnetic and Chemical signals; Interfacing and signal processing : Intelligent and smart Sensors, Concepts of redundant and multisensor systems. Operation in coded mode and mapping mode.

References:

1. Silicon Sensors – Middlehoek S and Audel S. A. – Academic Press, London 1989
2. Sensors and Actuators – No. 8, 1985 (pp 227-233)-No. 1986 (pp.65-82)
No. 12, 1987 (pp.129-144)
1. Chemical Sensors – Edmonds T. E. (Ed); Blackie – London, 1988
2. Sensors and Transducer – Patranabis D: PHI

Computer Communication

Code : EI 703 (c)
Contacts: 3L
Credits : 3

Data transmission principles, transmission components; ASK, PSK, QPSK, QAM, M - ory digital modulation; data compression; modems and their standards; Error control procedures; computer communication point to point, multidrop, circuit, message and packet switching; components of computer network, hosts, communications channel, terminals, protocols, multiplexers, concentrators etc. facsimile transmission, electronic mail, voice mail, internetworking; case study of computer communication networks. Introduction to Broadband, ATM and ISDN network.

References:

1. Computer Communication and Network – J R Freer – East West Press, 1990
2. Data Communication Computer Networks and OSS – F Halsall – Pearson 4/e.
3. Telecommunication and the Computer 3rd edn., - J Martin PHI, 1992
4. Telecommunication Network – A Tanenbarum, PHI, 1997
5. Data and Computer Communication – W Stallings 7/e Pearson
6. ISDN and Broadband ISDN – W Stallings 4/e Pearson.
7. Telecommunication Switching Systems and Networks – T Viswanathan, PHI, 1992
8. Broadband Telecommunication Technology – Artech House, 1993 by B G Lee, M Kand & J Lee.

Microelectronics and VLSI Technology

Code : EI 703 (d)
Contacts: 3L
Credits : 3

Basic Consideration in Microelectronics :

Discreet circuits vis-à-vis Microelectronics; Classification of different types of integrated circuits; General outline of hybrid integrated circuits based on thin and thick film technology; Semiconductor monolithic circuits based on bipolar, MOS and CMOS technology, Advantages and disadvantages of different types of integrated circuits; Structure-based classification of integrated circuits-SSI, MSI, LSI, VLSI and ULSI.

Thin and Thick Film Integrated Circuits

Methods of producing film, monitoring and control of film thickness; Design and fabrication of individual components; Processing steps for realization of systems.

Monolithic IC Technology :

Planner processing steps for realization of integrated circuit using bipolar, MOS and CMOS technology; Epitaxy; Diffusion; Ion-Implantation; Oxidation and passivation; Masking and lithography; Etching;

Applied Electronics & Instrumentation Engg (Old)

Metallisation and ohmic contacts; Die and wire bonding, packaging and encapsulation; Advantages and disadvantages of bipolar, MOS and CMOs systems.

VLSI and submicron Technology :

Limitations for micron and submicron integrated circuits; VLSI technology for doping, masking, lithography, etching and contacting.

Design Features and Systems :

Basic consideration and design approach using bipolar and MOS technology; Realisation of passive components, restrictive components and building blocks; Realisation of different active structures. Design considerations in respect of the isolation between components; Polarity dependence, high temperature dependence, poor tolerance of the components; Poor dissipation capability and cost; Design of op-amps, power amplifiers, regulated power supply, digital circuits and memory systems in the integrable form.

Layout :

Basic considerations design rules, hand layout and digitization, geometry specific and symbolic layout language; CIF to LSI layout description, Introduction to realization, and characterization of components and systems.

Yield and Reliability:

Failure mechanisms and yield loss; Failure analysis; Reliability considerations and improvements.

References:

1. Mead and Conway – Introduction to VLSI systems, Addison Wesley.
2. Amar Mukherjee – Introduction to CMOS VLSI, Prentice Hall
3. B. T. Press and M.J. Lorenzetti Benjamin (Eds.) physical design automation of VLSI systems.
4. R.K. Brayton et al – Logic Minimization for VLSI Synthesis – Klumer Academic Publisher.
5. T. Ohtsuki (Eds.) – Layout design and verification.
6. Wolf: Modern VLSI Design, Pearson Education

Eight Semester

Values and Ethics in Profession

Code : HU-801

Contracts : 3L

Credits : 3

Science, Technology and Engineering as knowledge and as Social and Professional Activities

Effects of Technological Growth:

Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development

Energy Crisis: Renewable Energy Resources

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics

Appropriate Technology Movement of Schumacher; later developments

Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.

Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

Ethics of Profession:

Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.

Applied Electronics & Instrumentation Engg (Old)

Profession and Human Values:

Values Crisis in contemporary society

Nature of values: Value Spectrum of a good life

Psychological values: Integrated personality; mental health

Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.

Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity

Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

References:

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Ed)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

Industrial Management

Code : HU-802

Contacts : 3L

Credits : 3

Basic concepts of management, objectives, classification and hierarchy, different schools of management thought, principal functions of management, Management as an organizing and directing force, Structure of the management decision making process, Organization structure, authority and responsibility, Organisation dynamics, Managerial leadership, communication systems, Managing human factors in business and industry, Industrial relation, Union activities, trade union acts, collective bargaining, disciplinary procedure.

Organizational objectives and long range forecasting, planning, organizing, programming and controlling process, managerial control strategies; quantity and quality control, cost benefit analysis, present work and breakeven analysis, budgetary control, use of management science for the efficient administration of economic units, production, financial and marketing management.

Adoption of statistical and computer methods and techniques to managerial research and managerial decision making and general management.

References:

1. Industrial Management - S C Jain, W S Bawa, Dhanpal Rai & Co. (P) Ltd.
2. Industrial Engineering & Production Management - Martand Telsang, S. Chand
3. Industrial & Business Management - Martand T. Telsang, S. Chand
4. Introduction to Materials Management - J Tony Arnold & Stephen N. Chapman, Pearson Education Asia
5. Production & Operations Management - Adam Pearson Education Asia
6. Industrial Relations, Trade Unions & Labour Legislation - Sinha, Pearson Education Asia
7. Business Organisation & Management - Tulsian, Pearson Education Asia.
8. Management in Engineering: Principles and Practice – Freeman, Bell & Balkwill, PHI
9. Essentials of Managements: Massie, PHI

Advanced Numerical Computation

Code : EI-801(a)

Contacts : 3L

Credits : 3

Selected advanced topics in analysis of numerical methods for serial and parallel computers from the following areas: Matrix computation and eigen value problems, System of non-linear equations, Ordinary and partial differential equations.

References:

1. Iseries and M J D Powel (Eds.) - The state of the art in Numerical Analysis - Oxford University Press, 1987
2. D M Young and R T Gregory - A survey of numerical mathematics - Vol-II - Addison - Wesley, 1973
3. D A H Jacobs (Ed.) - The state of the art in numerical mathematics
4. W R Modi - Parallel algorithms and matrix computations - Clarendon Press, Oxford, 1988
5. M J Quinn - Design of efficient - algorithms for parallel computer
6. D J Evans (Ed) - Parallel processing systems, Cambridge University Press, 1982
7. U Schendel - Introduction to numerical methods for parallel computers - Ellis Harwod Ltd., Chichester, 1984.
8. Charistopher, Baks, Philip (Ed.) - The numerical solution of non-linear problems, Clarendon Press, Oxford, 1981.
9. D. Heller - A survey of parallel algorithms in Numerical algebra, SIAM Review 10, 1978.

Applied Electronics & Instrumentation Engg (Old)

Bio Medical Instrumentation

Code : EI-801(b)
Contacts : 3L
Credits : 3

Introduction to the physiology of cardiac, nervous and muscular and respiratory systems.

Transducers and Electrodes : Different types of transducers and their selection for Biomedical applications, Electrode theory, different types of electrodes Hydrogen Calomel, Ag-AgCl, pH, PO₂ Pco₂ electrodes, selection criteria of electrodes. Cardiovascular measurement: The heart and other cardio systems, Measurement of Blood Pressure, Blood flow, Cardiac output and Cardiac rate, Electrocardiography, Phonocardiography, Ballistocardiography, Plethysmography, Magnet – Cardiography, Cardiac pace-maker, computer applications.

Measurement of Electrical Activities in Muscles and Brain: electromyography, Electroencephalograph and their interpretation. Respiratory System Measurement: Respiratory mechanism, Measurement of pH value of blood, ESR measurements, Haemoglobin measurement, oxygen and carbon dioxide concentration in blood, GSR measurement, polarographic measurements, computer applications.

Medical Imaging : Ultrasound imaging, Radiography and applications.

Biotelemetry : Transmission and Reception aspects of Biological signals via long distances.

Absence of Patient Care Monitoring.

References:

1. Webster J S – Medical Instrumentation – Application and Design
2. Cromwell L – Biomedical Instrumentation and Measurement, Pearson
3. Khandpur R S – Handbook of Biomedical Instrumentation, TMH, N. Delhi 1991
4. Astor B R – Introduction to Biomedical Instrumentation and Measurement, McMillan.
5. Carr – Introduction to Biomedical Equipment Technology 4/e – Pearson

Analytical Instrumentation

Code : EI-801(c)
Contacts : 3L
Credits : 3

Introduction – Difference between analytical and other instruments. On-line instrumentation and laboratory techniques. Sampling techniques for liquids and gases for analysis purpose. Gas analysis : Gas analysis : Gas chromatography, Thermal conductivity method, Head of reaction method, Estimation of oxygen, hydrogen, methen, carbon-dioxide, carbon-monoxide, etc. in binary or complex gas mixtures. Ziconia-probe oxygen analysers, Paramagnetic oxygen meters. Electrochemical reaction method. Humidity and moisture measurement techniques. Chemical composition analysis: Measurement of viscosity, turbidity meter consistency. pH and redox potential, electrical conductivity. Techniques of density measurement: Solids, liquids and gases. Spectrochemical analysis: Mass spectrometry, Emission spectrometry, Absorption spectrometry. Dispersive and nondispersive techniques.

References:

1. Patranabis D – Principles of Industrial Instrumentation, TMH publication, N. Delhi, 1976.
2. Liptak B.G (Ed) – Instrument Engineers' Handbook, Vol I and II and supplement I and II, Chilton Book Co., Philadelphia, 1972.
3. Jones E B – Instrument Technology, Vol. II, Analysis Instruments, Butterworths Scientific Publication, London.
4. O'Higgins P J - Basic Instrumentation in Industrial Measurement, McGraw Hill Book Co., NY 1966.

Pattern Recognition

Code : CS 801 (g)
Contacts : 3L
Credits : 3

Applied Electronics & Instrumentation Engg (Old)

Introduction to three facets of pattern recognition: clustering, classification, and feature analysis. Supervised learning, unsupervised learning, Bayesian classification, nearest neighbor classification, linear and quadratic discriminant functions. Linkage, k-means and ISODATA clustering technique. Introduction to feature extraction, selection and ranking.

Fuzzy sets, its relevance to pattern recognition. Fuzzy c-means clustering algorithms and fuzzy rule based classifications.

Motivation for neuro-computing, discussions on Hopfield networks, multilayer perception and learning vector quantization networks in relation to pattern recognition

References:

1. Introduction to Pattern Recognition – Statistical, structural, Neural and Fuzzy Logic approaches, World Scientific
2. Klir & Folger – Fuzzy Sets Uncertainty and Information, Pearson
3. Klir & Yuan – Fuzzy Sets and Fuzzy Logics – Theory and Applications, Pearson

Project Management & Operations Research

Code : M 801 (ga)

Contacts : 3L

Credits : 3

Project formalities – feasibility study-technical and economic evaluation; UNI DO, OECD and RBI guidelines. Network based project management-graph-theoretic applications. CPM, PERT, GERT and DCPM activities. Scheduling with limited resources, cash scheduling to multi projects situation. Project monitoring and control. Project management under risk and uncertainty.

Operations research-decision-making, development of OR Linear programming; Formulating of LP models, graphical solution, simplex method, duality theory and application. Transportation problem. Assignment problem. Waiting line models; elements of queuing models. Poisson arrival and exponential service time distribution, M/M/I Queue. Finite population models. Queuing art models. Applications. Simulation; modeling, use of random members, flow-chart development. Inventory control-introduction, costs, deterministic and stochastic models, buffer stocks.

References:

1. Introduction to Operation Research 6th Edn. – Hillier MGH
2. Introduction to Operation Research – A Ravindran, John Wiley, 1993.
3. Quality Planning & Analysis 3rd Edn. – Juran MGH
4. Computer Assisted Decision Models – R Kapoor, TMH, 1991
5. Operation Research – Taha – Pearson
6. Engineering Project Management – P Iyer Wheeler
7. Production & Operations Management : Concepts, Models & Behavior 5th Edn. – Admn & Ebert PHI.
8. Optimization in Operation Research – Rardin, Pearson
9. Advanced Operations Management – Mohanty – Pearson

Non Conventional Energy Sources

Code : EE-802(g)

Contacts : 3L

Credits : 3

Energy Sources - Classification, Need and potential of NCES, Electricity generation from NCES: Photovoltaics, Mono; poly - crystalline and amorphous Silicon solar cells, Efficiency and cost of PV systems; Wind electricity - wind as an energy source, wind electricity generating system - basic components, wind electric generators, siting of wind farms; Energy from Biomass - gasifiers and bio-gas reactors; Tidal energy; Wave energy and Geothermal energy; Environmental effects and Economics of NCES.

References:

Applied Electronics & Instrumentation Engg (Old)

1. Bansal, Kleeman & Melisa - "Renewable Energy Sources & Conversion Technology" - TMH New Delhi.
2. S P Sukhatme - "Solar Energy"
3. Twidell & Weir - "Renewable Energy Resources"; ELBS

Robotics

Code : EI-802(c)
Contacts : 3L
Credits : 3

Robot Anatomy Arm Geometry – Direct and Inverse Kinematics Problem, Arm Dynamics, D Alembert Equations of Motion, Synthesis of elements with movability constraints, manipulations – trajectory planning, joint interpolated trajectories.

Control of Robot Manipulation – computed torque technique, sequential and adaptive control, resolved motion control Robots.

Robots Sensing – range and Proximity and Higher – Level vision, illumination techniques, Imaging Geometry, Segmentation Recognition and Interpretation. Robot Programming languages Characteristics of Robot Level and Task Level Languages.

Robot Intelligence – State space search, Robot Learning, Robot Task planning, Knowledge engineering.

References:

1. K.S. Fu. R. C. Ganzalez, CSG Lee – Robotics Control, Sensing, Vision & Intelligence, McGraw – Hill, International Edition, 1987.
2. M.P. Groover, M. Weins, R.N.Nagel, N. C. Odrey, Industrial Robotics, McGraw Hill, 1986.
3. Andrew C. Straugard, Robotics & AI – Prentice Hall, Inc.
4. S. Sitharama Iyengar, Albetro Elefes, Autonomous Mobile Robots Control, Planning and Architecture, IEEE Computer Society Press.
5. Introduction to AI Robotics – Murphy PHI
6. Introduction to Robotics – Niku – Pearson
7. Introduction to Robotics – 2/e – Craig – Pearson.

Soft Computing – Theory and Applications

Code : CS 802 (g)
Contacts : 3L
Credits : 3

Introduction to soft Computing and its constituents.

Introduction to Fuzzy Sets and its importance in real life. Definition, Basic Operators, T-norm, S-norm, other aggregation operators. Fuzzy Relations, implications, cylindrical extensions, projection and composition.

Approximate reasoning, compositional rule of inference, rule based system, term set, Fuzzification, reasoning, defuzzification, different fuzzy models (MA/TS) – some applications of fuzzy rule based systems.

Introduction to artificial neural networks, basic models like Hopfield networks, multilayer perception and learning vector quantization network, self organizing features maps – their properties and applications.

Basics of genetic algorithm (GA) and its applications.

Some Hybrid (Neuro-fuzzy, fuzzy-neural and fuzzy-GA) systems.

References:

1. Dirankov & Hellemdron – Fuzzy Logic Control, Narosa
2. S Haykians – Neural Networks, Pearson
3. Anderson – An Introduction to Neural Network, PHI
4. Goldberg – Genetic Algorithm, Pearson
5. Rajsekaran & Pai – Neural Networks, Fuzzy Logic & Genetic Algorithm: Synthesis and Applications, Pearson
6. Bose – Neural Network Fundamentals and Graphs – Algorithms and Applications, TMH

Applied Electronics & Instrumentation Engg (Old)