

Electrical Engineering Syllabus Old

COURSE STRUCTURE FOR B.TECH IN ELECTRICAL ENGINEERING

3RD SEMESTE

CODE	THEORY	Contacts periods Per week			Total	Credits
		L	T	P		
A. THEORY:						
EE301	Circuit Theory & Networks	3	1	-	4	4
EE302	Electrical & Electronic Measurement	3	1	-	4	4
CS302	Data Structure & Algorithms	3	1	-	4	4
MS301	Materials Science	3	0	-	3	3
M 302	Mathematics	3	1	-	4	4
CS312	Numerical Methods & Programming	3	0	-	3	3
TOTAL OF THEORY					22	22
B. PRACTICAL						
EE 391	Circuits & Network Lab	0	0	3	3	2
EE 392	Electrical & Electronic Measurement Lab	0	0	3	3	2
CS 392	Data Structure Lab	0	0	3	3	2
CS382	Numerical Methods & Programming Lab	0	0	3	3	2
TOTAL OF PRACTICAL					12	8
TOTAL of Semester :					34	30

FOURTH SEMESTER

A. THEORY:

CODE	THEORY	Contacts periods Per week			Total	Credit
		L	T	P		
EE 401	Electrical Machines	3	1	0	4	4
EC 401	Analog Electronic Circuits	3	0	0	3	3
EC 402	Digital Electronics & Integrated Circuits	3	1	0	4	4
EE 402	Field Theory	3	0	0	3	3
ME 411	Thermal Power Engineering	3	1	0	4	4
TOTAL OF THEORY					18	18

B. PRACTICAL :

CODE	PRACTICAL	Contacts periods Per week			Total	Credit
		L	T	P		
EE491	Electrical Machine Lab	0	0	3	3	2
EC491	Analog Electronic Circuits Lab	0	0	3	3	2
EC492	Digital Electronics & Integrated Circuits Lab	0	0	3	3	2
ME 481	Thermal Power Engineering Lab	0	0	3	3	2
TOTAL OF PRACTICAL					12	8

C. SESSIONAL :

HU 481	Technical Report writing & / Language Practice Lab	0	0	0	3	2
TOTAL OF SESSIONAL					3	2
TOTAL :					33	28

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FIFTH SEMESTER

A. THEORY

SL NO.	CODE	THEORY	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EE 501	ELECTRICAL MACHINES	3	1	0	4	4
2	EE502	POWER SYSTEMS	3	1	0	4	4
3	EE503	CONTROL SYSTEMS	3	1	0	4	4
4	EE504	POWER ELECTRONICS	3	0	0	3	3
5	CS513	SYSTEM PROG. & OPERATING SYSTEM	3	0	0	3	3
		TOTAL THEORY				18	18

B. PRACTICAL

SL NO.	CODE	PRACTICAL	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EE 591	ELECTRICAL MACHINES LAB	0	0	3	3	2
2	EE592	POWER SYSTEMS LAB	0	0	3	3	2
3	EE593	CONTROL SYSTEMS LAB (PSPICE & MAT LAB)	0	0	3	3	2
4	EE594	POWER ELECTRONICS LAB	0	0	3	3	2
		TOTAL THEORY				12	8

TOTAL SESSIONS :

30

26

C. SESSIONALS

			0	0	0	0
Total of Sessionals					0	0
Total of Semester -					30	26

SIXTH SEMESTER

C. THEORY

SL NO.	CODE	THEORY	CONTACT PERIODS PER WEEK			TOTAL	CREDITS
			L	T	P		
1	EE 601	ELECTRICAL MACHINE DESIGN	3	0	0	3	3
2	EE602	POWER SYSTEMS	3	1	0	4	4
3	EE603	CONTROL SYSTEMS	3	1	0	4	4
4	EI611	MICROPROCESSOR & APPLICATIONS	3	1	0	4	4
5	EC 611	DIGITAL SIGNAL PROCESSING	3	1	0	4	4
		TOTAL OF THEORY				19	19

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D. PRATICAL

SL NO.	CODE	PRACTICAL	CONTACT PERIODS PER WEEK			TOTAL	CREDIT S
			L	T	P		
1	EE 691	ELECTRICAL MACHINE DESIGN LAB	0	0	3	2	2
2	EE692	POWER SYSTEMS LAB	0	0	3	2	2
3	EE693	CONTROL SYSTEMS LAB (PSPICE & MAT LAB)	0	0	3	2	2
4	EI681	MICROPROCESSOR & APPLICATIONS LAB	0	0	3	3	2
TOTAL OF PRACTICAL						9	8

C. SESSIONALS

1.	EE 682	GROUP DISCUSSION & SEMINAR	0	0	0	3	2
Total of Sessionals						3	2
Total of Semester -						31	29

6-week Industrial Training during summer vacation

SEVENTH SEMESTER

A. THEORY

Sl. No	Code	Theory	Contact Periods / Week			Total	Credits
			L	T	P		
1.	EE-701	Electric Drives	3	0	0	3	3
2.	HU-701	Financial Management & Accounts	3	0	0	3	3
3.	IT-701	Multimedia Systems	3	0	0	3	3
4.	EE-702	Elective-I	3	0	0	3	3
5.	EE-703	Elective-II	3	0	0	3	3
TOTAL THEORY						15	15

B. PRACTICAL

Sl. No	Code	Theory	Contact Periods / Week			Total	Credits
			L	T	P		
1.	EE-791	Electric Drives Laboratory	0	0	3	3	2
2.	IT-781	Multimedia Lab	0	0	3	3	2
3.	EE-794	Assigned Project	0	0	6	6	4
TOTAL PRACTICAL						12	8

C. SESSIONAL

Sl. No.	Code	Theory	Contact Periods / Week			Total	Credits
1.	EE-781	Practical Training Evaluation					3
2.	EE-782	Seminar on Assigned / Selected Topics	0	0	3	3	2
TOTAL SESSIONAL							5

TOTAL OF SEMESTER						30	28
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Elective-I(EE702A/B/C/D/E)

- a. Utilization of Electric Power
- b. Illumination Technology
- c. Hydroelectric Power Plant
- d. High Voltage Engineering
- e. Sensors & Transducers

Elective-II(EE703A/B/C/D/E)

- a. HVDC Transmission
- b. Power Generation Economics
- c. Power Plant Instrumentation & Control
- d. Non Conventional Energy Sources
- e. Power Plant Engineering

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EIGHTH SEMESTER

D. THEORY

Sl. No	Code	Theory	Contact Periods / 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.	EE-801	Elective-III	3	0	0	3	3
4.	EC/EI/CS/M-802	Elective-IV	3	0	0	3	3
TOTAL THEORY			12			12	12

E. PRACTICAL

Sl. No.	Code	Theory	Contact Periods / Week			Total	Credits
			L	T	P		
1.	EE-893	Assigned Project	-	-	12	12	8
2.							
3.							
4.							
TOTAL PRACTICAL							

F. SESSIONAL

Sl. No	Code	Theory	Contact Periods / Week			Total	Credits
			L	T	P		
1.	EE-881	Personality Development			3	3	2
2.	EE-882	Comprehensive Viva-Voce					4
3.							
4.							
5.							
TOTAL SESSIONAL							6

TOTAL OF SEMESTER						27	26
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Elective-III

a.	Computer Aided Power System Studies-EE-801(a)
b.	Optimization Techniques-EE-801(b)
c.	Advanced Numerical Computation-EE-801©
d.	Advanced Microprocessors-EE-801(d)
e.	Optimal Control Systems-EE801(e)
f.	Energy Management & Audit-EE-801(f)

Elective-IV

a.	Communication Engineering-EC802(a)
b.	Remote Control & Telemetry-EI-802(b)
c.	Computer Communication-EC-802©
d.	AI and Neural Networks-CS-802(d)
e.	Probability & Statistics-M-802(e)
f.	Project Management & Operation Research-M-802(f)

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Syllabus of B.Tech. in Electrical Engineering

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
- 2.Engineering circuit analysis with PSPICE and probe-Roger,MH
- 3.Engg Circuit Analysis,: Hayt 6/e Tata Mcgraw-Hill
- 4.Valkenburg M. E. Van, "Network Analysis", Prentice Hall
- 5.A. Chakravarty: Networks, Filters & Transmission Lines
- 6D.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.
- 9 Sivanandam: Electric Circuits Analysis
- 10 Gupta: Circuit Analysis with Computer Application, New Age International
- 11 Mann: Introductory A.C.Circuit Theory, Universities Press
- 12 Aatre: Network Theory & Filter Design, New Age International
- 13 Adby: Applied Circuit Theory, New Age International
- 14 Wadhwa: Network Analysis & Synthesis, New Age International
- 15 Roychowdhury: Linear Integrated Circuits, New Age International
- 16 Roy Choudhury D., "Networks and Systems", New Age International Publishers.
- 17 V.K. Chandna, A Text Book of Network Theory & Circuit Analysis, Cyber Tech

References :

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

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

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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. Electronic Instrumentation – H.S. Kalsi, ISTE/EXCEL BOOKS
3. Singh: Industrial Instrumentation & control 2/e Tata Mcgraw-Hill, NewDel
4. Sawhney A K : A course in Electrical & Electronic Measurements & Instruments, Dhanpat rai
5. Kalsi: Electronic Instrumentation TMH
6. Heltrick A.D. & Cooper W.D. : Modern Electronic Instrumentation & Measuring Instruments; Wheeler
7. Patranabis D: Sensors & Transducers, Wheeler 96
8. R.V. Jalgaonkar.: Electronics Instrumentation.
9. Sutko: Industrial Instrumentations
10. Bolton W: Instrumentation & Process Measurement, Universities Press
11. Reissland: Electrical Measurement, New Age International

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.

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Text books:

1. Data Structures and Algorithms – O.G. Kakde and U.A. Deshpande, ISTE/EXCEL BOOKS
2. Aho Alfred V., Hopperoft John E., Ullman Jeffrey D., “Data Structures and Algorithms”, Addison Wesley
3. Drozdek A –Data Structures and Algorithms
4. Pujari A.K. – Data Mining & Techniques, Universities Press
5. Ajay Agarwal- Data Structure Through C, Cyber Tech

References :

- 1.Heileman :data structures algorithms &OOP Tata McGraw Hill
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.
4. Horowitz Ellis & Sartaj Sahni, “Fundamentals of Data Structures”, Galgotria Pub.
- 5.Tanenbaum A. S. , “Data Structures using ‘C’ ”

MATERIAL SCIENCE

Code : MS 301

Contacts : 3L

Credits :3

Introduction : Classification of materials; Structure-property Relations; Metals & Alloys, Ceramics, Polymers, Composites and Semiconductors. Atomic Structure & Interatomic Bonding ; Fundamentals of Atomic Structure and Chemical Bonding; Atomic Bonding in Solids.

Phase Diagrams : Phase Rules; Single component and Binary Phase diagrams; The Level Rule; Hume-Rothery rules of alloying.

Diffusion in solids : Fick’s Laws of Diffusion; The Atomic Model of Diffusion

Phase Transformations: Nucleation and Growth , Recovery, Re crystallization and Grain Growth.

Environmental Degradation of materials : Oxidation and Corrosion; Thermal and Photo Degradation ; Chemical Degradation ; Radiation Damage.

Structure of solids : Crystalline and Non-crystalline states; Crystallographic directions and phases; Determination of crystal structures.

Defects and imperfections in solids : Point, Line and Planer defects; Interfacial defects and volume defects; impurities in solids.

Elastic, Plastic and Viscoelastic Behaviour of materials: Stress-strain relationship; relaxation and creep; strengthening mechanism and fracture.

Thermal properties of materials : Heat capacity; Thermal expansion and thermal conductivity.

Electrical properties : Electronic and Ionic conduction; Energy Band structures in solids ; Electron Mobility ; Temperature variation of conductivity.

Dielectric behaviour : Capacitance ; Types of polarization ; Frequency dependence of dielectric constant; Ferroelectricity and Piezoelectricity in materials.

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Magnetic properties : Diamagnetic; Ferromagnetic, antiferromagnetic and Ferrimagnetic behaviour of materials; soft and hard magnetic materials; superconductivity.

Optimal properties : Light interaction with solids; Absorption, Transmission and Reflection; Luminescence; Photoconductivity ; Lasers.

Materials selection: Material properties and Engineering Design parameters; General effects of processing on parameters; selection of structural; Electronic and Magnetic Materials – case studies.

Text Books:

1. L.H. Van Vlack - Elements of Materials Science & Engineering – Addison-Wesley Publishing Company, New York.
2. V Raghavan – Materials Science & Engineering. – Prentice Hall of India Pvt. Ltd., New Delhi.
3. Murthy & Jena: Structure and properties of Engineering Materials ,TMH New Delhi
4. W D Callister, Jr. – Materials Science & Engineering – An Introduction – John Willey & Sons, Inc, New York.
5. J F Shackelford – Introduction to Materials Science for Engineers – Maxwell Macmilan International Editions, Singapore.
6. C M Srivastava & C Srinivasan – Science of Engineering materials – New Age International (P) Ltd. Publishers, New Delhi.

Reference Books:

7. J W Mayer and S S Lau – Electronic Materials Science - Maxwell Macmilan International Editions, Singapore
8. R E Hummel – Electronic Properties of Materials – Narosa Publishing House, New Delhi.

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 it's application to evaluation of integral; Introduction to Conformal Mapping; Simple problems. 14L

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Probability and Statistics:

Mean, Median, Mode and Standard Deviation; Samples Space; Definition of Probability; 10L
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.

Graph Theory:

Graphs; Digraphs; Isomorphism; Walk; Path; Circuit; Shortest Path: Dijkstra's Algorithm; Tree; 12L
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).

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
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. Dhama: Differential Calculus, New Age International

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;

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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 Seidel 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, and 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:

Text Books:

1. Numerical Analysis & Algorithms, Pradeep Niyogi, TMH, 1st ed.
2. Numerical Mathematical Analysis by J.B.Scarborough
3. C Language and Numerical Methods by C.Xavier
4. Introductory Numerical Analysis by Dutta & Jana
5. Balagurusamy: Numerical Methods
6. Discrete Mathematical Structure – Rakesh Dube and Vijay Vir, EXCEL BOOKS
7. Numerical Methods (Problems and Solution) by Jain, Iyengar , & Jain
8. Numerical Methods In Computer Applications – P.U.Wayse. EPH
9. Computer Orinted Numerical Method- N. Dutta vikash
10. Numerical Methods with Programs in Basic Fortran Pascal & C++ - S.B.Rao, Universities Press
11. Computer Programming & Numerical Analysis – N.Dutta, Universities Press
12. Numerical Methods for Engineers – Gupta, New Age International
13. Numerical Solutions of Differential Equations – Jain M.K.,New Age International
14. Numerical Methods for Scientific & Engg Computation – Jain M.K.,New Age International
15. Numerical Analysis – Rao G.S.,New Age International
16. Discrete Mathematical Structures – Rao G.S., New Age International
17. Foundations of Discrete Mathematics – Joshi K.D., New Age International
18. Applied Discrete Structures – Joshi, New Age International
19. 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

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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
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 Non-recursive 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

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Assignments on Statistical Problem: Mean, Median, Mode, Standard deviation (for simple & frequency type data), Correlation & Regression

COURSE STRUCTURE IN ELECTRICAL ENGINEERING

ELECTRICAL ENGINEERING

ELECTRICAL MACHINES

Code : EE 401

Contacts : 3L + 1T

Credits : 4

General Principles of Dynamo-electric machinery

D.C. Machines :

Construction magnetic circuit, armature winding, Types of excitation. Generated e.m.f. – performance equations for generators and motors operation and characteristics. Interpoles and commutation parallel operation of generation.

Starting and speed control of d.c. Motors (including electronic control)

Losses & efficiency – testing of D.C. machines.

3-phase transformers – types – phasor groups. Effects of unbalanced loading, generation of harmonics by transformers and their suppression, 3-phase to 2-phase and 3-phase to multiphase transformation.

3-winding transformers – parameters estimation, voltage regulation – applications. Parallel operation of transformers. Autotransformers and phase-shifters.

3-phase induction machines – types, construction, rotating magnetic field and principle of operation – slip. Equivalent circuit, performance equations – torque slip curve, Common tests – parameter estimation. Starting and speed control of induction motors. Braking – trouble and troubleshooting.

Text :

1. Nagrath I.J. & Kothari D.P. : Electric Machines, TMH
2. Bhattacharya—Electrical Machines ,2/e,TMH
3. Mukherjee P K & Chakraborty S : Electrical Machines ; Dhanpat Rai Pub.
4. Sen S K : Electrical Machines ; Khanna Pub.
5. Clayton A.E. & Hancock N N : Performance & Design of Direct Current Machines, CBS Pub. & Distributors;
6. Parker Smith- Problems in Electrical Engg; - CBS Pub & Distributors.
7. Say M G : Performances & Design of A.C. Mechines; CBS Publishers & Distributors.

Reference:

1. Fitzgerald--- Electric Machinery, 6/e, TMH
2. Kothari & Nagrath—Theory & Problems in Electric Machines , 2/e ,TMH

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.

Electrical Engineering Syllabus Old

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 timers.

Linear voltage regulator: series and shunt.
Switched mode power supply.

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

Electrical Engineering Syllabus Old

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.

FIELD THEORY

Code: EE 402

Contacts: 3L

Credits: 3

Introduction – Physical interpretation of gradient, divergence and curl. The Laplacian operator, vector relationship in Rectangular, cylindrical and spherical polar coordinate systems.

Electric Field: Potential and potential gradient, Stoke's Theorem, Green's Theorem, Divergence and curl equations. Laplace and poisson's equation, Helmholtz Theorem, Field equations in different coordinate systems, boundary conditions, dipoles.

Magnetic Field: Scalar and vector potentials. Divergence and curl of magnetic field. Force and Torque equations. Field equations in different coordinate systems. Boundary conditions.

Electromagnetic Field: Time varying field and Faraday's law. Displacement current Maxwell's wave equation. Wave equations in conducting medium. Skin effect. Wave equations in imperfect dielectrics. Reflection, Refraction, and Polarization of Electromagnetic waves. Maxwell's Field equations vs circuit equations.

Pointing vector and flow of power. Transmission line analogy.
Element of Electromagnetic fields in Electrical Machines

Text:

1. Hayt—Engineering Electromagnetics , 6/e ,TMH
2. Edminister-- Electric Circuits, 3/e (Schaum Series) , TMH
3. Edminister—Theory & Problems in Electromagnetic, 2/e (Schaum Series), TMH

Reference:

1. Kraws—Electromagnetics with Applications, 5/e, MH

THERMAL POWER ENGINEERING

Code : ME 411

Contacts : 3L + 1T

Credits :4

Water Tube & Fire Tube boilers, Circulating Principles, Forced Circulation, Critical pressure, Superheaters, Reheaters, attemperators, induced draught, forced draught and secondary air Fans, Boiler performance

Electrical Engineering Syllabus Old

analysis and heat balance. Combustion Systems, Environmental Protection – ESP, Cyclone Separator, Dust Collector etc.

Rotary Thermodynamic devices – Steam turbines & their classifications – Impulse & Reaction type Turbines, Thermodynamics of compressible fluid-flow, equation and continuity – Isentropic flow through nozzles, velocity diagram, Blade efficiency, optimum velocity ratio, multi-staging, velocity & pressure compounding, losses in turbines, erosion of turbine blades, turbine governing, performance analysis of turbine, Condensing system.

IC Engines – classification. Analysis of a standard cycle, fuel characteristic of SI & CI Engine, Combustion, Engine performance. Automotive Engine exhaust emission and their control.

Gas turbine Analysis – Regeneration - Reheating, Isentropic efficiency. Combustion efficiency.

Text:

1. P.K.Nag- Engineering Thermodynamics – TMH ,2/e
2. P K Nag- Power Plant Engg. - TMH Pub
3. P.S. Ballaney- Thermal Engineering – Khanna Pub
4. Domkundwar & Arora- Power Plant Engineering –Dhanpat Rai & Co.

Reference:

1. Cengel --- Thermodynamics , 3/e ,TMH
2. Et-Wakil—Power Plant Engineering , MH
3. M W Zemansky & R.H.Dittman -Heat and Thermodynamics – McGraw Hill ,7/e

ELECTRICAL MACHINES LAB

Code: EE 491

Contacts: 3 P

Credit2: 2

1. Study of the characteristics of a separately excited D.C generator.
2. Studies of the characteristics of a D.C shunt motor.
3. Speed control of a D.C motor.
4. Study of the characteristics of a compound D.C generator (short shunt)
5. Measurement of the speed of a D.C series motor as a function of load torque.
6. Study of the equivalent circuit of a single-phase transformer.
7. Polarity test on single phase transforms and study of the different connections of three-phase transformer.
8. Study of the equivalent circuit of three-phase induction motor by No-Load & Blocked-Rotor tests.
9. Study of the performance of wound Rotor induction motor under load.
10. Study of the performance of three-phase Squirrel-Cage induction Motor-Determination of Iron-Loss, Friction & Windage Losses.

ANALOG ELECTRONIC CIRCUITS LAB

Code: EC491

Contacts: 3 P

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.

Electrical Engineering Syllabus Old

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 ELECTRONICS & INTEGRATED CIRCUITS LAB

Code: EC 492

Contacts: 3 P

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.

THERMAL POWER ENGG. LAB

Code: ME 481

Contacts: 3P

Credits: 2

1. Study of Cut Models – Boilers IC Engines
 - ❖ Lanchashire Boiler
 - ❖ Bahcock & Willcox Boiler
 - ❖ Cochran Boiler
 - ❖ Vertical Tubular Boiler
 - ❖ Locomotive Boiler
 - ❖ 4S Diesel Engine
 - ❖ 4S Petrol Engine
 - ❖ 2S Petrol Engine

Electrical Engineering Syllabus Old

2. Load Test on 4 Stroke Petrol Engine & Diesel Engine by Electrical Load Box.
3. Load Test on 4 Stroke Diesel Engine by Rope Brake Dynamometer.
4. Heat Balance on 4 Stroke Diesel Engine by Rope Brake Dynamometer & by Electrical Load Box.
5. Valve Timing Diagram on 4S Diesel Engine Model & 4S Petrol Engine Model.
6. To find the Calorific Value of Diesel Fuel & Coal by Bomb Calorimeter.
7. To find the Flash Point & Fire Point of Petrol & Diesel Fuel.
8. To find the Cloud Point & Pour Point of Petrol & Diesel Fuel.
9. To find Carbon Particle Percentage in Diesel Engine Exhaust Smoke by Smokemeter and trace the BHP Vs. % Carbon Curve.
10. Measurement of the Quality of Steam – Enthalpy & Dryness fraction.
11. To find out the Boiler performance – Boiler efficiency & Steam evaporation rate.
12. To visit a Thermal Power Station & study of the followings :
 - a) Boiler
 - b) Steam pipe
 - c) Furnace
 - d) Economizer
 - e) Preheater
 - f) Steam turbines
 - g) Alternator
 - h) Water treatment plant
 - i) E. S. P.

TECHNICAL REPORT WRITING & / LANGUAGE PRACTICE LABORATORY

Code: HU 481

Contacts: 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. Afterwards the class is divided into groups and the students have to discuss on given topics on current socio-economic-political-educational importance(12 hours)
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

Electrical Engineering Syllabus Old

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
WEST BENGAL UNIVERSITY OF TECHNOLOGY

ELECTRICAL MACHINES

CODE : EE 501

CONTACTS : 3L + 1T

CREDITS : 4

SINGLE PHASE INDUCTION MOTOR: CONSTRUCTION, DOUBLE REVOLVING FIELD THEORY & CROSS FIELD THEORY, STARTING METHODS, SPEED- TORQUE CHARACTERISTICS, PHASOR DIAGRAM & CONDITION FOR MAXIMUM TORQUE, DETERMINATION OF EQUIVALENT CIRCUIT PARAMETERS, APPLICATIONS.

SINGLE PHASE SERIES MOTOR, COMPENSATED & UNCOMPENSATED MOTORS, UNIVERSAL MOTORS CHARACTERISTICS.

SYNCHRONOUS MACHINES- CONSTRUCTION & TYPES , WINDINGS, GENERATORS & MOTOR OPERATIONS, ARMATURE REACTIONS, PHASOR DIAGRAMS, 2- AXIS THEORY, VOLTAGE REGULATION.

PARALLEL OPERATION OF ALTERNATORS, SYNCHRONOUS MACHINES CONNECTED TO INFINITE BUS – BAR, STARTING OF SYNCHRONOUS MOTORS , V- CURVES, TORQUE ANGLE CHARACTERISTICS, HUNTING.

ELECTROMECHANICAL ENERGY CONVERSION PRINCIPLES & INTRODUCTION TO GENERALISED THEORY OF ELECTRICAL MACHINES.

SPECIAL ELECTROMECHANICAL DEVICES: ELECTRICAL MACHINES USED FOR SPACE & ROBOTIC APPLICATION , SWITCHED RELUCTANCE MOTOR , PERMANENT MAGNET MACHINES.

STEPPER MOTOR, HYSTERESIS MOTOR, SUB FRACTIONAL ELECTRICAL MACHINES.

LEVITATION MACHINE, FORCE MACHINE , ENERGY MACHINE.

BOOKS :

- **Bhimbra P.S.: Electrical Machinery; Khanna Pub**
- Nagrath I.J. & Kothari D.P. : Electric Machines, TMH
- Mukherjee P K & Chakraborty S : Electrical Machines ; Dhanpat Rai Pub.
- Sen S K : Electrical Machines ; Khanna Pub.
- Fitzgerald: Electric machinery, TMH

Electrical Engineering Syllabus Old

- Clayton A.E. & Hancock N N : Performance & Design of Direct Current Machines, CBS Pub. & Distributors;
- Parker Smith- Problems in Electrical Engg; - CBS Pub & Distributors.
- Say M G : Performances & Design of A.C. Mechines; CBS Publishers & Distributors.
- Gupta: Fundamentals of Electrical Machines, New Age International
- Bhattacharya: Control of Electrical Machines, New Age International
- Bhattacharya: Experiments in Basic Elect Engg, New Age International
- Athani: Stepper Motors

POWER SYSTEM

CODE: EE502

CONTACTS :3L+1T

CREDITS : 4

Power transmission systems – Electrical characteristics of overhead lines and cables. Per unit representation of system quantities. Steady state performance of transmission network – ABCD parameters of short, medium and long lines. Methods of active and reactive power control – use of VAR compensators

Elements of economic operations. Electricity tariffs.

Distribution systems – feeders and distributors radial and mesh system – distribution sub-station – earthing, Important I.E. rules Indian Electricity Acts.

BOOKS :

1. Stevenson W.D. : Elements of Power System Analysis; McGraw Hill International Edn.
2. Grainger J J & Stevenson W.D. Power System Analysis ; McGraw Hill Intl. Edn.
3. Nagrah I J & Kothari D.P. : Power System Engg. TMH Pub. Co. Ltd.
4. Saadat: Power System Analysis, TMH
5. Pabla A.S. : Electric Power Distributors System TMH Pub.
6. K.C.Pal: Heat Power, Orient Longman
7. Wadhwa: Electrical Power Systems, New Age International
8. Wadhwa: High Voltage Engineering, New Age International

CONTROL SYSTEM

Code : EE 503

Contacts : 3L + 1T

Credits :4

Concept of feedback and Automatic Control, Electrical analogy of physical system. Transfer Function, Block diagram representation of Control Systems, Block Diagram Algebra, Signal Flow Graph, Mason's gain formula.

Control system components : Error sensing devices, potentiometer, synchros, D.C. and A.C. tachometers, servomotors, modulators and demodulators. Transient analysis of closed loop systems. Transient errors and their minimisation, steady state error and their minimisation, error coefficients, P, PI and P-I-D type controllers.

Stability of Control Systems : R-H criteria, Nyquist criteria, Bode Plots. Polar Plots, Nichols chart, measures of relative stability. Construction of Root Loci for simple system, effects of the movement of poles and zeros.

Improvement of system performance through compensation. Case studies on control voltage, current, frequency, position and speed. Control of liquid level, density, flow, temperature etc.

BOOKS :

1. Kuo B.C. Automatic Control System, PHI
2. Madan Gopal: Control Systems: Principles and Design, TMH

Electrical Engineering Syllabus Old

3. Das Gupta S : Control System Theory ; Khanna Pub.
4. Nagrath I J & Gopal M : Control Systems Engineering, New Age International Pub.
5. Ogata K : Modern Control Engg. PHI
6. Dorf R C & Bishop R.H.: Modern Control System ; Addison – Wisley
7. Bolton: Industrial Control & Instrumentation, Orient Longman
8. Nakra: Theory & Applications of Automatic Control, New Age International
9. Gopal: Modern Control System Theory, New Age International
10. Gopal: Digital Control Engineering, New Age International
11. Sinha: Control Systems, New Age International
12. N K Jain : A course in Automatic Control System Engg. – Dhanpat Rai

POWER ELECTRONICS

Code : EE 504

Contacts : 3L + 1T

Credits :4

Power semiconductor devices PNP diodes, DIACS Thyristors, TRIACS, G.T.O. devices. Power Transistors, Power MOSFET, Rating, Losses and Cooling. Triggering circuits for SCR's, 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.

D.C. line commutation : Series and parallel capacitor turn off, resonant turn off, impulse commutation.

D.C. Choppers : Principles, classification, use.

Frequency conversion : Cycloconverter single and three phase circuits, 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 : D.C. and A.C. drives, S.M.P.S., Resonant converters, A.C. Line Filters, ratio, interference suppression. HDVC transmission.

BOOKS :

1. Rammurthy M – An Introduction to Thyristors and their applications
2. Lauder C W - Power Electronics, 3rd Edn. MHI 1993
3. Sen P C – Power Electronics, TMH
4. Rashid M H – Power Electronics, PHI Pub.
5. Dubey S K – Thyristorised Power Controller; John Wiley & Sons
6. Singh M D & Khanchandni : Power Electronics ; TMH Pub.
7. Dewan S B & Stranghen A – Power Semiconductors circuit
8. Mohan N, Underland T M & Robbins W P : Power Electronics, John Wiley & Sons.
9. Bose B K : Modern Power Electronic ; Jaico Pub. House
10. Dubey G.K.: Thyristorised Power Controllers, New Age International
11. Subramanyam: Power Electronics, New Age International
12. Sugandhi: Thyristors: Theory & Applications, New Age International

SYSTEM PROGRAMMING & OPERATING SYSTEM

CS 513

Contacts : 3L

Credits - 3

Assemblers [12L]

One pass and Two Pass, Macro Processors, Linkers, Loaders: absolute and relocating loaders, editors and Debuggers, Introduction to Compilers

Electrical Engineering Syllabus Old

System Calls [3L]

Programming using system calls (in DOS or Unix)

Operating System [3L]

Introduction to Operating system, O.S. services and Kernel, Multiprogramming and Time Sharing

Processor Scheduling [3L]

Preemptive and non-preemptive, algorithms (FCFS, SJF, RR, priority)

Process Synchronization [6L]

Critical section problem, critical region, semaphores, monitors

Memory management [3L]

Swapping, paging, Demand paging and virtual memory

I/O and device management [4L]

I/O hardware, interrupts, DMA, Block and Character Devices, blocking and non-blocking I/O, spooling and device reservation

Disk and File Management [4L]

Disk structure, disk scheduling (FCFS, SSTF, SCAN), boot block

Deadlocks, Concurrent processes, protection and security [4L]

Introduction to multiprocessors and Distributed O.S. [6L]

Text Books / References:

1. L. L. Beck: "An introduction to System Programming" Addison Wesley
2. D. Dhandhere "System Programming" TMH
3. A Silberschaz & Galvin " Operating System Concepts" Addison Wesley
4. Tanenbaum "Modern Operating System" Prentice Hall of India
5. Sumitava Das " Unix Systems V.4 Concept and Application" TMH
6. Maurice J Bach " The Design of Unix Operating System" PHI

ELECTRICAL MACHINES LAB

Code : EE 591

Contacts : 3 P

Credit : 2

LIST OF EXPERIMENTS

- 1) DIFFERENT METHOD OF STARTING OF 3 PHI SQ.CAGE INDUCTION MOTOR & THEIR COMPARISON [D.O.L,AUTO TRANSFORMER & STAR-DELTA].
- 2) SPEED CONTROL OF 3 PHI SQUIRREL – CAGE INDUCTION MOTOR BY DIFFERENT METHODS & THEIR COMPARISON[VOLTAGE CONTROL & FREQUENCY CONTROL].
- 3) DETERMINATION OF REGULATION OF AN ALTERNATOR BY SYNCHRONOUS IMPEDENCE METHOD.
- 4) DETERMINATION OF MAGNETISATION CHARACTERISTICS OF AN ALTERNATOR . a) at no – load rated speed b) at no- load half rated speed c) at full load (non inductive load) rated speed.
- 5) Load test on 1 phi induction motor & deriving its performance characteristics.
- 6) Study of various connections of 6- coil alternator & its operation at no – load.
- 7) To determine the direct axis reactance [X_d] & quadrature axis reactance [X_q]

Electrical Engineering Syllabus Old

- 8) Load test on a wound rotor induction motor & deriving its performance characteristics.
- 9) Determination of equivalent circuit parameters of a 1 phi induction motor.
- 10) To make connection diagram of full pitch & fractional slot winding of a 18 slot sq. cage induction motor for 6 pole & 4 pole operation.

POWER SYSTEMS LAB

Code : EE 592

Contacts : 3 P

Credit : 2

List of experiments

- 1) Determination of the generalized constants A,B,C,D of a long transmission line.
- 2) Simulation of DC distribution by network analyzer.
- 3) Measurement of earth resistance by earth tester.
- 4) Dielectric strength test of insulating oil.
- 5) Determination of break down strength of solid insulating material.
- 6) Different parameter calculation by power circle diagram.
- 7) Study of different types of insulators.
- 8) Active & reactive power control of an alternator.
- 9) Study and analysis of an electrical transmission line circuit with the help of PSPICE.
- 10) Dielectric constant , tan delta , resistivity test of transformer oil.

CONTROL SYSTEM LAB (PSPICE & MAT LAB)

Code : EE 593

Contacts : 3 P

Credit : 2

List Of Experiments

- 1) Familiarisation with MAT- Lab- control system tool box, MAT –Lab- simulink tool box & PSPICE.
- 2) DETERMINATION OF STEP RESPONSE FOR FIRST ORDER & SECOND ORDER SYSTEM WITH UNITY FEEDBACK ON CRO & CALCULATIONS OF CONTROL SYSTEM SPECIFICATIONS LIKE TIME CONSTANT , % PEAK OVERSHOOT, SETTLING TIME ETC., FROM THE RESPONSE.
- 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 2ND ORDER SYSTEM & DETERMINATION OF DIFFERENT CONTROL SYSTEM SPECIFICATIONS FROM THE PLOT.
- 5) DETERMINATION OF PI, PD, PID CONTROLLER ACTION OF FIRST ORDER SIMULATED PROCESS.
- 6) DETERMINATION OF APPROXIMATE TRANSFER FUNCTION EXPERIMENTALLY FROM BODE PLOT.
- 7) EVALUATION OF STEADY STATE ERROR, SETTLING TIME, PERCENTAGE PEAK OVERSHOOT, GAIN MARGIN, PHASE MARGIN WITH ADDITION OF LEAD COMPENSATOR & BY COMPENSATOR IN FORWARD PATH TRANSFER FUNCTION FOR UNITY FEED BACK CONTROL SYSTEM USING PSPICE OR OTHERWISE.
- 8) STUDY OF A PRACTICAL POSITION CONTROL SYSTEM & DETERMINATION OF CONTROL SYSTEM SPECIFICATIONS FOR VARIATION OF SYSTEM PARAMETERS.

POWER ELECTRONICS LAB

Code : EE 594

Contacts : 3 P

Credit : 2

LIST OF EXPERIMENTS

Electrical Engineering Syllabus Old

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 CONVERTOR.
6. SIMULATION ON THE SINGLE PHASE AC-DC UNCONTROLLED CONVERTOR WITH & WITHOUT THE SOURCE INDUCTANCE.
7. SIMULATION OF A SINGLE PHASE AC TO CONTROLLED DC CONVERTOR WITH & WITHOUT THE SOURCE INDUCTANCE.
8. SINGLE PHASE HALF CONTROLLED BRIDGE CONVERTOR WITH TWO THYRISTORS & TWO DIODES.
9. SINGLE PHASE FULLY CONTROLLED BRIDGE CONVERTOR USING FOUR THYRISTORS.
10. PSPICE SIMULATION OF DC TO DC STEP DOWN CHOPPER.
11. PSPICE SIMULATION OF SINGLE PHASE CONTROLLER WITH R-L LOAD.
12. PSPICE SIMULATION OF PWM BRIDGE INVERTOR OF R-L LOAD USING MOSFET.

WEST BENGAL UNIVERSITY OF TECHNOLOGY

SYLLABUS FOR SIXTH SEMESTER

OF

ELECTRICAL ENGINEERING

ELECTRICAL MACHINE DESIGN

Code: EE 601

Contacts : 3L

Credits : 3

Basic design principles and approaches, specification, Magnetic and electric loading, output equations and output coefficients, Main dimensions. Ratings, Heating cooling and temperature rise.

Transformer : Magnetic circuit, core construction and design, winding types, insulation, Loss allocation and estimation, Reactance, Temperature rise.

D C Machine: No. of poles and main dimensions, armature, windings, Magnetic circuit and Magnetisation curve, Commutator and brushes.

Induction Machine-3 phase: Rating specifications, standard frame sizes, Main dimensions specific loadings, Design of stator windings, Rotor design – slots and windings, calculations of equivalent circuit parameters.

Synchronous Machine: Main dimensions, Magnetisation characteristic, Field winding design.

Computer assisted design of above machines.

BOOKS:

1. Sawhney A K; A Course in Electrical Machine Design; Dhanpat Rai & Co.
2. Clayton A E & Hancock N N : The Performance and Design of Direct Current Machines ; CBS Publishers and Distributors

Electrical Engineering Syllabus Old

3. Say M G : The Performance and Design of Alternating Current Machines; CBS Publishers and Distributors.
4. Sen S K : Principles of Electrical Machine Design with Computer Programs ; Oxford & IBH Pub. Co.
5. Norton, Machine design, Pearson Education

POWER SYSTEM

Code : EE 602

Contacts : 3L + 1T

Credits :4

Nature of faults in electrical systems, fault calculations, symmetric and asymmetric faults – method of sequence components – sequence networks.

Protective relays and their applications to power apparatus and systems.

Principles of circuit breakers – different types, oil circuit breakers, air circuit breakers, vacuum circuit breakers, SF₆ – circuit breakers , their uses and comparison.

Transients in Power System and protection against them.

Elements of Power System dynamics, Computer methods in Power System Analyses, load Flow Studies.

BOOKS :

1. Nagrath & Kothari – Power System Engg.- TMH
2. Rao S S – Switchgear & Protection ; Khanna Pub
3. Van Warrington A R – Protective Relaying Vol I; Chapman Hall
4. Van Warrington A R – Power System Protection Vol II; Chapman Hall
5. Singh, Electric Power Generation, Transmission & Distribution, PHI
6. Sauer, Power Systems-Dynamics & stability, Pearson Education
7. Mason – The Art & Science of Protective Relaying, Wiley
8. Electrical Transmission & Distribution Reference Book; Westinghouse
9. Wadhwa C. L. : Electrical Power System, New Age Intl. (P) Ltd.
10. Stevenson Jr., Power System Analysis – International Student Edition
11. El-abiad & Stagg – Computer Methods in Power System
12. M A Pai – Computer Techniques & Power systems
13. Jayachrista, Power System Analysis, Scitech

CONTROL SYSTEMS

Code : EE 603

Contacts : 3L + 1T

Credits :4

State valuable analysis of dynamic systems – continuous, discrete, sampled data and TVP systems, concept and properties associated with state equations, Linear Transformations on state variables. Canonical variables, decoupled response, solutions of state equations, state transition matrix, properties. Application of Z-transform method to state variable analysis of sampled data system. Phase plane methods of obtaining trajectories for linear and non linear systems. Non conservative systems, limit cycles, computation of time, stability studies. Realization of systems. Controllability and observability realization of linear feedback controller, the pole allocation problems. Linear system design by state variable feedback. Different types of non linearities and their effect, harmonic linearisation.

Stability analysis : Describing function technique. The second method of Lyapunov.

Introduction to Optimal Control – quadratic index and regulator problems.

Electrical Engineering Syllabus Old

Logic control – digital and computer control.

BOOKS :

1. Gopal M : Control Systems, Principles & Design – TMH
2. Nagrath I J & Gopal M : Control Systems Engg. - New Age International
3. Ogata K : Modern Control Engg. – PHI/ Pearson Education
4. Bandyopadhyaya, Control Engg., PHI
5. Stefani, Design of feedback Control System, OUP
6. Gibson J E : Nonlinear Control System - McGraw Hill Book Co.
7. Goodwin, Control System Design, Pearson Education
8. Ramakalyan, Control Engineering, Vikas
9. Lyshevski, Control System Theory with Engineering Applications, Jaico
10. Kuo B.C. : Digital Control System- Oxford University Press.
11. Natarajan A/Reddy, Control Systems Engg., Scitech
12. Jury E.I. : Sampled Data Control System- John Wiley & Sons Inc.
13. Dorf R.C. & Bishop R H : Modern Control System- Pearson Education.
14. Herniter, Programming in MATLAB, Vikas

MICROPROCESSOR AND APPLICATIONS

Code : EI 611

Contacts : 3L +1T

Credits : 4

Introduction to computer architecture and organisation ; Architecture of 8-bit microprocessors ; Bus configuration ; The CPU Module ; Binary and Hexadecimal number representations ; Introduction of assembly language and machine language programming ; Introduction set of typical (8085) 8-bit processor ; Subroutines and stacks ; programming exercises ; Timing diagram ; Memory technology ; ROM and RAM families ; Memory interfacing ; Interfacing of input- output ports ; programmable peripheral interface chips, serial and parallel data transfer schemes, programmed and interrupt driven data transfer ; Direct memory access ; Programmable interval timer ; Microprocessor development and trouble shooting tools, interfacing of ADC and DAC chips , 8-bit micro-controllers –Architecture and programming of 8031/8051, typical application, IEEE 488 Bus. Introduction to 8086 – 16 bit microprocessor.

BOOKS :

1. Gaonkar R.S. - Microprocessor Architecture, Programming and Applications, Wiley Eastern.
2. Malvino A.P. -Digital Computer Applications, An introduction to Microprocessor, Tata McGraw Hill, New Delhi, India.
3. Hall D.V. -Microprocessors and Digital System, Mc-Graw Hill.
4. Borole, 8085 Microprocessor, Jaico
5. Leventhal L.A. -8080A/8085 Assembly Language Programming , Tata Mc-Graw Hill.
6. Short, Microprocessors & Programmed logic, Pearson Education
7. Mathivanam, Microprocessor, PHI
8. Bose S.K. -Gates to Microprocessors, Wiley Eastern, 1986.
9. Ahsom S. -Microprocessors with Application in Process Control, TMH, ND, 1986.
10. Chowdhury & Chowdhury – Microprocessors, Scitech

Electrical Engineering Syllabus Old

11. Ajit Pal – Microprocessor, Principles & Applications - TMH

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 Z- 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 filter 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 hardwares : Architectural features, Fixed point processors, floating point processors. Control and Instrumentation application – Telemetry and metering.

BOOKS :

1. Mitra S : Digital Signal Processing - A computer based approach ; TMH
2. Proakis J.C. & Manslakis M G: Digital Signal Processing : Principles, Algorithms & Applications: PHI/ Pearson Education
3. Chen, Digital Signal Processing , OUP
4. Johnson, Digital Signal Processing, PHI
5. Babu Ramesh, Digital Signal Processing, Scitech
6. Ingle, Digital Signal Processing Using MATLAB, Vikas
7. Ifeachor, Digital Signal Processing, Pearson Education
8. Salivahanan S, Vallavaris A, Gnanpruja C: Digital Signal Processing ; TMH Pub.
9. Oppenheim A V & Shaffer R.W. : Digital Signal Processing, Pearson Education /PHI;
10. Oppenheim A V & Shaffer R.W : Discrete time Signal Processing, Pearson Education /PHI;

11. Rabiner L R & Gold B : Theory & Applications of Digital Signal Processing, PHI

ELECTRICAL MACHINE DESIGN LAB

Code : EE 691

Contacts : 2P

Credits :2

Design of Transformer core, windings and calculations of performances.

Estimation of main dimensions of d.c. machines after selecting poles, Design of poles and armature windings.

Calculations of main dimensions of Induction motors and design of stator windings and selection of slots. Design of (i) squirrel cage and slip-ring rotors.

Electrical Engineering Syllabus Old

Calculation of main dimensions of salient pole and cylindrical synchronous machines. Design of air gap and pole.

POWER SYSTEM LAB

(List of experiments)

Code : EE 692

Contacts : 2P

Credits : 2

1. Study on (i) on load Time Delay Relay (ii) off load Time Delay Relay
2. Polarity, Ratio and Magnetisation Characteristics Test of CT & PT
3. Testing on (i) Under Voltage Relay and (ii) Earth Fault Relay
4. Study on D C Load Flow
5. Study of A C Load Flow Using Gauss – Seidel Method
6. Study of A C Load Flow Using Newton Raphson Method
7. Study on Economic Load Dispatch
8. Study of Transformer Protection by Simulation
9. Study of Generator Protection by Simulation
10. Study of Motor Protection by Micon Relay
11. Study of Different Characteristics of Over Current Relay

CONTROL SYSTEM LAB (PSPICE & MAT LAB)

(List of Experiments)

Code : EE 693

Contacts : 2P

Credits : 2

1. Design of load compensation and by compensation using PSPICE or MATLAB
2. Familiarization and use of MATLAB command associated with state variable analysis and Digital Control System.
3. Determination of phase plane trajectory and possibility of limit cycle of common non-linearities.
4. Familiarisation with digital controller and determination of response due to variation of controller parameters.
5. Determination of response with common nonlinearity as introduced into the forward path of a 2nd order unity feedback control system using MATLAB.
6. Determination of response in Z- domain using MATLAB SIMULINK Toolbox or otherwise.

MICROPROCESSOR AND APPLICATIONS LAB

Code : EI 681

Contacts : 3P

Credits : 2

Electrical Engineering Syllabus Old

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.

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. a) Familiarization with 8085 simulator on PC.

b) Study of prewritten programs using basic instruction set (data transfer, load/Store, Arithmetic, Logical) on the simulator.

c) Assignments based on above.

4. Programming using kit/simulator for

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

5. Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg. subroutine for delay, reading switch state and glowing LEDs accordingly, finding out the frequency of a pulse train etc.

6. Interfacing any 8-bit latch (eg 74LS373) with trainer kit as a peripheral mapped output port with absolute address decoding.

7. Interfacing with I/O modules :

a) ADC

b) Speed control of mini DC motor using DAC

c) Keyboard

d) Multi-digit Display with multiplexing

e) Stepper motor

8. Study of 8031/8051 Micro Controller kit and writing programmes for the following tasks using the kit.

9. a) Table look up

b) Basic arithmetic and logical operations

c) Interfacing of keyboard and stepper motor

West Bengal University of Technology

Structure & Academic Curricula for B. Tech in Electrical Engineering

SEVENTH SEMESTER

ELECTRIC DRIVES

Code: EE-701

Contacts: 3L

Credits: 4

Concept of electrical drives: group, individual and multimotor drives, quadrantal diagram speed torque characteristics under four quadrant operation of d.c. and induction motors.

Electrical Engineering Syllabus Old

Speed control of D.C. motors: Ward Leonard, Buck-boost, series-parallel control, rectifier and chopper fed drives, up based controllers for D.C. drives.

Induction motor drives: Pole changing, frequency variation, stator voltage variation, rotor resistance variation, slip power recovery, variable voltage - variable frequency control, (VVVF).

P.W.M., inverter, cycloconverter control, non-sinusoidal voltage operation, A.C. regulators closed loop regulators.

Synchronous Motor Drives: Wound field brushless excitation, voltage source inverter drive. Constant v/f, E/f and field weakening control. Cycloconverter control, self controlled synchronous motor drive.

Starting and Braking: soft starts, regenerative and dynamic braking. Transients and dynamics of electric motors under starting and braking conditions.

Heating and Power Ratings: Service conditions of electric drives and selection of motor capacities. Operation of electric drives incorporating flywheel under shock loading conditions.

Motor Controllers: PL, Stepper Motor, Tachogenerator, Industrial application.

Principles of Electric Traction: Traction motor, Traction motor control, EMU, DMU

Books:

1. Pillai S K: A First course in Electrical Drives, New Age International Pub.
2. De N K and Sen P K : Elective Drives; PHI
3. Subramaniyan V: Elective Drives - Concepts and Applications; TMH Pub.
4. Krishnan, Electrical Motor Drives, Pearson Education
5. Elsharwaki, Electrical Drives, Vikas
6. De. G : Electrical Drives and their Control; Academic Books Ltd.
7. Dubey G K et. Al. Electrical Drives, New Age Pub.

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]

Electrical Engineering Syllabus Old

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 , Mcmenamin, OUP
9. Financial Mgmt & Policy, Van Horne, PHI
10. Financial Mgmt, Kulkarni & Satyaprasad, Himalaya

MULTIMEDIA SYSTEMS

Code: IT-701

Contacts: 3L

Credits: 3

Allotted Hrs.: 45L

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

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

Electrical Engineering Syllabus Old

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. Halsall, Multimedia Communication, Pearson Education
3. Jakob Nielsen - "Hypertext and hypermedia", Boston, Academic Press, 1990
4. Arch C Luther - "Design interactive multimedia", Bantam Books, NY, 1992
5. Andleigh & Thakrar, Multimedia Systems, PHI
6. Corough, Multimedia Systems & Web Design, Vikas

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", Pearson Education,
3. Chapman, N. and Chapman J. - "Digital multimedia", John Wiley, 2000
4. Elsom Cook - "Principles of Interactive Multimedia", McGraw Hill, 2001, ISBN 007-709610
5. Buford, J. K., - "Multimedia Systems", Pearson Education Asia, 2000
6. Vannevar Bush (Foundation Paper) - "As we may think"

ELECTIVE-I

UTILIZATION OF ELECTRIC POWER

Code: EE-702 (a)

Contacts: 3L

Credits: 3

Traction: System of track electrification, train movement and energy consumption (speed time curves, crest speed, average speed and schedule speed) rctive effort, factors affecting energy consumption (dead weight, acceleration weight and adhesion weight) starting and braking of traction motors, protective devices.

Illumination: Laws of illumination, polar, curves, photometry, integrating spheres, types of lamps, lamp fittings, Light control, design aspects of indoor and outdoor lighting.

Welding: Its classification, resistance, arc and ultrasonic welding, characteristics of welding transformers - modern welding techniques and control.

Electrical Engineering Syllabus Old

Heating: Resistance heating, induction and dielectric heating.

Electrolytic Processes: Electroplating, Anodizing, Electro-cleaning, Electro extraction etc.

Books:

1. Wadha C L - Utilization of Electric Power; New Age International
2. Wadha C L - Generation, Distribution and utilization of electrical energy; New Age International Ltd.
3. Singh, Electric Power Generation, Transmission & Distribution, PHI
4. Partab H - Art and Science of Utilization of Electrical Energy; Dhanpat Rai & Sons
5. A T Dover - Electric Traction

ILLUMINATION TECHNOLOGY

Code: EE-702 (b)

Contacts: 3L

Credits: 3

Sources of light: Day light, artificial light sources, energy radiation, visible spectrum of radiation, black body radiation and full radiator. Incandescence, dependence of light o/p on temperature. Theory of gas discharge and production of light. Perception of light and colour, optical system of human eye, eye as visual processor. Reflection, refraction and other behaviour of light.

Measurement of light - radiometric and photometric quantities, units of measurement, standardization. Measurement of light distribution, direct and diffused reflection, fundamental concepts of colourimetry and measurement of colour.

Types of lamps: GLS, Tungsten - halogen, Discharge, low pressure sodium vapour fluorescent, metal - halide, IR and VV lamps - their construction, filament material, theory of operation, life, characteristics and application.

Design, objectives and specifications of lighting and systems; design of luminance, electrical circuits and auxiliaries, basic lighting design, consideration and lighting parameters for extension lighting, interior lighting and day lighting.

Energy conservation in lighting.

Books:

1. Wadha C L: Utilization of Electric Power - New Age International Ltd.
2. Wadha C L: Generation, Distribution and Utilization of electrical energy - New Age International Ltd.
3. Singh, Electric Power Generation, Transmission & Distribution, PHI
4. Partab H: Art and Science of Utilization of Electrical Energy, Dhanpat Rai & Sons.
5. Fink & Beaty - Standard Hand Book for Electrical Engineers - McGraw Hill International.

HYDROELECTRIC POWER PLANT

Code: EE-702(c)

Contacts: 3L

Credits: 3

Hydro-electricity generation - large and small hydro-plants, Run of river systems, Turbine types, Estimation of potential - hydrology studies, Selection of sites, Geo-physical characteristics, Design of Civil and electrical systems, pump storage schemes. Economics of small hydel projects, Environmental effects, Need for larger utilization for better load management.

Books:

Electrical Engineering Syllabus Old

1. J Blackstone, Davidson et.al - "Hydro Electric Engineering Practicve Vol.I to III" - Brown Brackie & Sons.
2. Creager & Austin - "Hydro Electric Handbook" - John Wiley
3. Doland - "Hydro Electric Power Engineering" - Rowland Press

HIGH VOLTAGE ENGINEERING

Code: EE-702(d)

Contacts: 3L

Credits: 3

Electrostatic fields - Calculation and experimental determination. Study of high voltage, behaviour in solid, liquid and gas with application to high voltage cables and other electrical apparatus viz. Transformers and circuit breakers, production and measurement of Direct, Alternating and impulse voltages. Theory and operation of impulse generators. Characteristics of high voltage testing transformers.

High voltage testing of dielectric materials: Tests on cables, insulators and transformers (IS standard). Lightning phenomena and protection, Basic impulse insulation level, insulation coordination.

Books:

1. Naidu M S - High Voltage Engg., 3rd Edition, Tata McGraw Hill 2003
2. Kuffel & Abdullah - High Voltage Engg., Pergamon 1977
3. Razevig D V - High Voltage Engg., Khanna 1972
4. Schwab A J - High Voltage Measurement Technique, MIT Press 1972
5. Meek J M - High Voltage Laboratory Technique, 1954
6. C L Wadhwa - High Voltage Engineering, New Age International Ltd.

ELECTIVE-II

HVDC TRANSMISSION

Code: EE-703(a)

Contacts: 3L

Credits: 3

AC/DC Conversion - Hg. Arc, SCR, Bridge rectifier and inverter circuits. Recent trends of HVDC valves. Principles of grid control, firing angle control, harmonic analysis, commutation failure, starting and stopping of DC Link.

Reactive Power requirement, types of forced commutation. Corona and Radio interference, protective devices.

Smoothing reactors - Functions, double commutation failure, consequent commutation failure - their prevention.

Simulation of HVDC systems, Parallel operation of HVDC and AC systems, multiterminal DC systems.

Stability of AC/DC interconnected systems.

Books:

1. Chakraborty A, Kothari D P, Mukhopadhyay A K - The Performance, Operation and Control of EHV Power Transmission Systems; Wheeler Pub.
2. Das Begamudre R - The E H V A C Transmission - New Age International.

Electrical Engineering Syllabus Old

POWER GENERATION ECONOMICS

Code: EE-703(b)

Contacts: 3L

Credits: 3

Cost of Power Generation - Thermal, Hydro and Nuclear - Types of Consumers in a distribution system - Domestic, Commercial, Industrial etc. Concepts of load factor, power factor, diversity factor, demand factor.

Electricity Tariff - Block rate, flat rate, two part, three part tariffs. Subsidization and cross subsidization. Availability tariff of generation companies. Pool tariff of transmission companies.

Economics of Power Generation - Incremental fuel cost. Unit commitment. Spinning reserve. Economic Dispatch - Computation of transmission loss. Active and reactive power optimization. Upper and lower frequency limits. Optimal hydro - thermal scheduling.

Books:

1. Kirchmayer, L K - Economic Operation of Power Systems - John Wiley, New York
2. Nagrath, I J & Kothari, D P - Modern Power System Analysis - Tata McGraw Hill
3. Elgerd O L - Electric Energy System Theory - McGraw Hill

POWER PLANT INSTRUMENTATION AND CONTROL

Code: EE-703(c)

Contacts: 3L

Credits: 3

Block Diagram of different parts of a Power Plant and scope of Instrumentation - Measurements on Boiler Plant, Turbo-generator Plant and Nuclear Reactors.

Measurement:

Fuel Measurement and various types of weighing systems.

Pressure Measurement - capsules; bellows; diaphragm gauges; bourdon tube pressure gauges; pressure transducers - capacitive type, piezo resistive type; Smart pressure transmitters.

Temperature Measurement - resistance temperature detectors; thermocouples; radiation pyrometers.

Flow Measurement - head type-orifice, venturi; area type-rotameter; mass flow meter.

Level Measurement - capacitive sensors; ultrasonic; DP transmitters.

Analytical:

Gas Analysis - Oxygen - zirconium sensor, paramagnetic; SO_x; NO_x; CO, CO₂

Liquid Analysis - pH; conductivity; dissolved oxygen

Coal Analysis - moisture, carbon, ash

Control:

Boiler Control - Steam pressure control, combustion control, Furnace Draft control, Steam temperature control, Feed water control

Data logger and computer control, supervisory control and monitoring system.

Books:

Electrical Engineering Syllabus Old

1. Deobelin E O: Measurement System - Application and Design; TMH.
2. Arora S C & Domkundwar S: Power Plant Engg.; Dhanpat Rai & Co. (P) Ltd.
3. Johnson C: Process Control Instrumentation Technology; PHI/Pearson Education
4. Shawney A K: The Electrical and Electronic Measurement and Instrumentation Dhanpat Rai & Co.
5. Watt Boyes (Editor): Instrumentation Reference Book, 3rd ed.; Butterworth Heineman
6. Douglas M. Considine: Process / Industrial Instruments & Controls Handbook, 4th Ed.; McGraw Hill International Edition.
7. Modern Power Station Practice (Control & Instrumentation), Vol-F; Pergamon Press.

NON-CONVENTIONAL ENERGY SOURCES

Code: EE-703(d)

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.

Books:

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

ELECTRIVE DRIVES - LIST OF EXPERIMENTS

Code: EE-791

Contacts: 3P

Credits: 2

1. Study of thyristor controlled DC Drive.
2. Study of Chopper fed DC Drive
3. Study of AC Single phase motor-speed control using TRIAC.
4. PWM Inverter fed 3 phase Induction Motor control using PSPICE / MATLAB / PSIM Software.
5. VSI / CSI fed Induction motor Drive analysis using MATLAB/DSPICE/PSIM Software.
6. Study of V/f control operation of 3 Φ induction motor drive.
7. Study of permanent magnet synchronous motor drive fed by PWM Inverter using Software.
8. Regenerative / Dynamic braking operation for DC Motor - Study using software.
9. Regenerative / Dynamic braking operation of AC motor - study using software.
10. PC/PLC based AC/DC motor control operation.

MULTIMEDIA SYSTEM LAB

Code: IT-781

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).

Electrical Engineering Syllabus Old

PRACTICAL TRAINING EVALUATION

Code: EE-781

Credit: 3

Evaluation of the Practical Training undergone for 6 weeks during summer vacation after 6th semester.

SEMINAR ON ASSIGNED / SELECTED TOPICS

Code: EE-782

Contacts: 3P

Credit:2

Seminar based on contemporary assigned / selected topics.

NEW ELECTIVES:

SENSORS AND TRANSDUCERS

EE-702(e)

Elective Course (7th Sem Electrical Engineering)

Contacts: 4L

Credits:3

Module I

Definition, principles of sensing and transduction, classification	1
Mechanical and Electromechanical sensors	
Resistive (potentiometric) type: resolution, accuracy, sensitivity	1
Strain Gauges: theory, types, sensitivity, gauge factor, variation with temperature,.	1
Inductive sensors: common types- reluctance change type, mutual inductance change type, transformer action type, magnetostrictive type.	1
LVDT: Construction, output-input relationship, I/O curve, discussion	1
Proximity sensor	1

Module II

Capacitive sensors: Variable distance- parallel plate type, Variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type: calculation of sensitivities	3
Stretched Diaphragm type: microphones, response characteristics	2
Piezoelectric elements: piezoelectric effects, charge and voltage coefficients, crystal model, materials, natural and synthetic types – their comparison, force and stress sensing, ultrasonic sensors	3

Module III

Thermal sensors:	
Material expansion type: solid, liquid, gas and vapour	2
Resistance change type: RTD, materials, construction, tip sensitive and stem sensitive type, Thermister materials, shapes, ranges, accuracy specifications.	3
Thermoemf sensors: types, thermoelectric powers, general consideration	1
Junction semiconductor type IC and PTAT type	2
Radiation sensors: types, characteristics and comparisons	2
Pyroelectric type	1

Module IV

Magnetic sensors:	
Sensors based on Villari effect for assessment of force, torque, proximity; Wiedemann effect for yoke coil sensors, Thomson effect.	
Hall effect and Hall drive, performance characteristics	4
Radiationsensors: LDR, photovoltaic cells, photodiodes, photo emissive cells- types, materials, construction, response	2
Geiger counters, Scintillation detectors	2

Electrical Engineering Syllabus Old

Introduction to Smart sensors	2
Humidity, pH, conductivity	1
Velocity, Acceleration: Electromagnetic velocity sensor; spring-mass-system, measurement of deflection principle of accelometers, sensitivity, noise	1 1
Flow: Pressure gradient technique; (orifice, venture, pitot,) rotameter thermal transport technique; electromagnetic sensor, laser doppler anemometry; ultrasonic sensors	4

42

Books:

1. D Patranabis, Sensors and Transducers, PHI, 2nd ed.
2. E. A. Doebelin, Measurement Systems: Application and Design
Mc Graw Hill, New York

H. K. P. Neubert, Instrument Transducers, Oxford Un

Elective Paper for 7th. Semester Electrical Engineering.

POWER PLANT ENGINEERING

EE-703(e)

L-T-P = 3-0-0

LAYOUT OF POWER PLANT

Layouts of Steam, hydel, nuclear power plants - Comparison and selection. Switch yard Layout.

STEAM BOILER AND CYCLES

Modern high pressure and supercritical boilers - Analysis of power plant cycles - modern trends in cycle improvement - Waste heat recovery, Fluidized bed boilers.

FUEL AND ASH HANDLING, COMBUSTION CHAMBER, DRAUGHT, AIR POLLUTION

Preparation and handling of coal - Pulveriser - Dust collector - Ash removal; Stokers - Different types - Pulverised fuel burning, ESP; Draught - Different types - Selection of blowers, Cooling towers - Different types - Analysis of pollution from thermal power plants - Pollution controls

INSTRUMENTATION

CO₂ recorders - Automatic controls for feed water, steam, fuel, air supply and combustion

NUCLEAR POWER GENERATION

Elementary treatment - Nuclear fission, chain reaction – Pressurised water reactors, boiling water reactors, gas cooled reactors - Fast breeder reactors.

HYDRO-ELECTRICITY GENERATION

Large and small hydro-plants, Run of river systems, Turbine types, Estimation of potential - hydrology studies, Selection of sites, Geo-physical characteristics, Design of Civil and electrical systems, pump storage schemes.

TEXT BOOKS:

1. Power Plant Engineering - P. K. Nag - Tata McGraw Hill
2. Power Plant Technology - M. M. EL - Wakil - McGraw Hill
3. Power Plant Engineering - Morse
4. Power Plant Engineering - Domkundwar

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5. Power Plant Engineering - P. C. Sharma
6. Power Plant Engineering – Rajput
7. A Text Book on Power system engineering – Chakrabarti, Soni, Gupta, Bhatnagar- Dhanpat Rai
8. A Course in Electrical Power – J. B. Gupta – S. K. kataria & Sons
9. Power Plant Engineering – K. K. Rmalingam – Scitech Pub.

REFERENCES:

1. Power Plant Engineering - Gaffert
 2. Power Plant Theory & Design - P.I. Potter - Ronald Press
 3. Modern Power Plant Engineering - J. Weisman, R. Eckart
 4. Power Station Engineering & Economy'- Skrotzki
 5. The Elements of Nuclear Power - Bennet, Thomson
 6. Standard handbook of Power Plant Engineering - Elliott
 7. Modern Power Station Practice: VoL 1 to 8 - British Electricity Intl., London -Paragamon Press
 8. Power Station engineering & Economy – Skrotzki, Vopat - TMH
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West Bengal University of Technology
Structure & Academic Curricula for B. Tech in Electrical Engineering
EIGHTH SEMESTER

VALUES & ETHICS IN PROFESSION

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.

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

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

Books:

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

Credit: 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.

Books:

1. Industrial Management - S C Jain, W S Bawa, Dhanpat Rai & Co. (P) Ltd.
2. Industrial Management, Vol.1 L.C. Jhamb, EPH,
3. Industrial Engineering & Production Management - Martand Telsang, S. Chand
4. Industrial & Business Management - Martand T. Telsang, S. Chand
5. Introduction to Materials Management - J Tony Arnold & Stephen N. Chapman, Pearson Education Asia
6. Production & Operations Management – Adam, Pearson Education /PHI
7. Industrial Relations, Trade Unions & Labour Legislation - Sinha, Pearson Education Asia
8. Business Organisation & Management - Tulsian, Pearson Education Asia.

ELECTIVE-III

COMPUTER AIDED POWER SYSTEM STUDIES

Code: EE-801(a)

Contacts: 3L

Credit: 3

Introduction: Load flow analysis - iterative methods of load flow solution; Numerical solution of large sparse systems, State Estimation, least squares estimation - Basic solution and sequential form of solution. Static state estimation, treatment of bad data, Different load forecasting techniques.

Automatic Generation Control - Single and multi-area systems. Optimal control. Decentralized control. Control of load frequency (LF) controller. Power system optimization, unit commitment, economic dispatch. Active and reactive power optimization, Hydro-thermal scheduling.

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Real time computer control of Power system, configuration, security, monitoring and state estimation, Economic despatch and LF control.

Data Acquisition system; man-machine interface.

Books:

1. Mahalanabis A K, Kothari D P & Ahson: Computer Aided Power System Analysis & Control
2. Elgard O I: An Introduction to Electrical Energy System Theory; TMH
3. Kusic, Computer Aided Power System Analysis, PHI
4. Wood & Wollenberg: Power Generation Operation and Control;
5. Stagg & Elabiad - Computer Methods in Power System
6. M A Pai - Computer Technique in Power Systems

OPTIMISATION TECHNIQUES

Code: EE-801(b)

Contacts: 3L

Credits: 3

Unconstrained and Constrained minimization of functions. Lagrange multiplier method, Linear programming, simplex method, Duality Dynamic programming, Principles of optimality.

Application to Control and management problems, Miscellaneous topics, sequencing, scheduling and inventory control.

Books:

1. Hadley G: Linear Programming; Pearson Education
2. Vaserstein, Introduction to Linear Programming, Pearson Education
3. Rao B, Optimization Techniques, Scitech
4. Panneerselvam, Operation research, PHI
5. Kalavathy, Operation research, Vikas
6. Hadley G: Non-linear & Dynamic Programming; Pearson Education.
7. Rao S S: Optimisation Theory and Applications - Wiley Eastern Ltd., New Delhi
8. Rao S S: Engineering Optimization (3rd Ed); New Age Int. (P) Ltd.
9. Gottfried B S and Weisman J: Introduction to Optimization Theory; Prentice Hall
10. Mittal K V and Mohan C: Optimization Methods in Operations Research & System Analysis; New Age Int (P) Ltd.
11. Dreyfus S. E - The Art & Theory of Dynamic Programming - Theory & Applications; Academic Press

ADVANCED NUMERICAL COMPUTATION

Code: EE-801(c)

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.

Books:

1. Iseries and M J D Powel (Eds.) - The state of the art in Numerical Analysis - Oxford University Press, 1987
2. Rajaraman, Computer Aided Numerical Methods, PHI
3. Arumugam, Numerical Methods, Scitech
4. Gerald, Applied Numerical Analysis, Pearson Education
5. Shankara Rao, Numerical Methods, PHI
6. N.Dutta, Computer Oriented Numerical Methods, Vikas
7. D M Young and R T Gregory - A survey of numerical mathematics - Vol-II - Pearson Education
8. D A H Jacobs (Ed.) - The state of the art in numerical mathematics
9. W R Modi - Parallel algorithms and matrix computations - Clarendon Press, Oxford, 1988

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10. M J Quinn - Design of efficient - algorithms for parallel computer
11. D J Evans (Ed) - Parallel processing systems, Cambridge University Press, 1982
12. U Schendel - Introduction to numerical methods for parallel computers - Ellis Harwod Ltd., Chichester, 1984.
13. Christopher, Baks, Philip (Ed.) - The numerical solution of non-linear problems, Clarendon Press, Oxford, 1981.
14. D. Heller - A survey of parallel algorithms in Numerical algebra, SIAM Review 10, 1978.

ADVANCED MICROPROCESSORS

Code: EE-801(d)

Contacts: 3L

Credits:3

Evolution of computer organisation; design methodology - Register and processor level; Processor design organisation, Instruction formats, Arithmetic Operation; Control design; Hardware Control, Micro-programmed control; Memory organisation, Addressing schemes for main memory, virtual memory, high speed memory, Memory interfacing, Input-output systems, Interrupt handling. Organization 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.

Books:

1. Transputer Development System - Inmos Ltd., PH 1988
2. W V Subbarao -16/32 Bit Microprocessors 68000/68010/68021, Software, Hardware & Design Applications -, Macmillan Pub Co.
3. D Tabak -Advanced Microprocessors - MGH 1995
4. Chowdhury & Chowdhury, Microprocessor & Peripherals, Scitech
5. Triebel & Singh -The 8088 and 8086 Microprocessors Programming, interfacing, software and Hardware application -, PHI
6. Brey- Intel Microprocessors - The 8086/8088/80186/80286/80386, 80486 Pentium Pro-Processor; Architecture, Programming & interfacing – PHI/Pearson Education

OPTIMAL CONTROL SYSTEMS

Code: 801(e)

Contacts: 3L

Credits: 3

Formulation of optimal control problem: Minimum time, minimum energy, minimum fuel problem, state regulator, output regulator & tracking problems.

Calculus of variations: Constrained fixed point and variable point problems, Euler Lagrange equations.

Problems with equality and inequality constraints. Engineering application, Lagrange, Mayer & Bolza problems, pontryagins Maximum (minimum) principle.

Multiple decision process in discrete and continuous time - The dynamic programming.

Numerical solution of two point boundary value problems - the steepest descent method and the Fletcher - Powell Method.

Books:

1. Athems M & Falb P. L.: Optimal Control; McGraw Hill
2. Tau J.: Modern Control Theory; McGraw Hill
3. Goodwin, Control System Design, Pearson Education/PHI
4. Anderson & Moore, Optimal Control, PHI
5. Glad, Control Theory, Vikas
6. Hestenas M C: Calculus of Variations and Optimal Control. Theory; Wiley.
7. Boltyanskii V G; Gamkrelidze R V; Pontryagin L S; On the theory of Optimal process

Electrical Engineering Syllabus Old

8. Bellman R E and Kolaba R E: Dynamic Programming and Modern Control Theory; Academic Press.

ENERGY MANAGEMENT AND AUDIT

Code: 801(f)

Credits: 3

Contacts: 3L

Introduction, Energy Analysis and Thermodynamics energy costs of Fuel, Food, Materials, Goods, Services. Social and Economic cost benefit aspects , Methods of Energy Analysis. Energy Analysis of 'Real' Industrial systems -Factory, Transportation system, Energy production systems case studies, Principles of Multi objective Energy Management with emphasis on conservation, pollution and evaluation of alternative Energy Resources, Design of Energy Management Programmes. Auditing Procedures, Measures for Energy Conservation.

Books:

1. Albert : Plant Engineers & Managers Guide to Energy Conservation
2. Wayhe C.Tuner : Energy Management Handbook
3. Anthony J. Pansini. : Engineering Economic Analysis Guide Boo
4. D. Paul-Mehta : Handbook of Energy Engineering.
5. Paul O'Callaghan : Energy Management.

COMMUNICATION ENGG

Code: EC-802(a)

Contacts: 3L

Credits: 3

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 over different transmission channels.

Channel Capacity, Shannon's Theorem, Nyquist Criterion and Sampling. Pulse modulation types, detection of PAM, PWM & PPM, Pulse generation. Quantisation of analog signals - generation noise. A/D & D/A conversions. PCM, DM, ADM, DPCM, ADPCM for speech signals. Time division and Frequency division multiplexing. Digital modulations: SK, FSK, PSK, DPSK, QPSK & MQAM. Modems. Elements of information theory. Error control and coding Data transmission-synchronization, data protection, error detection and corrections - protocol. Elements of optical communication - optical fibre and sources. Photo-detectors, optical connectors and couplers. Analog and digital transmission using opto - devices.

Elements of satellite communications - tracking and control, launching. Propagation characteristics. Satellite transponders and antennas. Modern trends in communications systems.

Books:

1. B P Lathi, Holt - Modern Digital and Analog Communication System -,OUP
2. G. Kennedy - Electronic communication Systems - TMH
3. R Coolen - Electronic Communication - PHI (1989)
4. Hancock - An introduction to the Principles of Communication Theory - TMH

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5. Taub and Schilling - Principles of Communication systems – TMH
6. Roddy, Electronic Communication, Pearson Education/PHI
7. S. Haykin - Communication systems - Pearson Education/PHI
8. Dungan, Electronic Communication Systems, Vikas
9. Carlson - Communication Engg.

REMOTE CONTROL & TELEMETRY

Code: EI - 802(b)

Contacts: 3L

Credits: 3

Introduction : classification of telemetry systems - voltage, current, position, frequency and time. Components of telemetering and remote control systems. Quantization theory - sampling theorem, sample and hold, data conversion-coding.

Multiplexing-time division multiplexers and demultiplexers-theory and circuits, scanning procedure; frequency division multiplexing with constant bandwidth and proportional bandwidth, demultiplexing.

Data acquisition and distribution system. Fundamentals of audio-telemetry system - R.F. links. Telemetry design system. Standard for telemetry e.g. JRIG etc. Microwave links. Pulse code modulation (PCM) techniques. Practical telemetry system - pipe line telemetry, power system telemetry, supervisory telecontrol systems. Introduction to ISDN.

Books:

1. Swobada G - Telecontrol Method and Application of telemetering and remote control - Van Nostrand, 1971.
2. Schwartz M - Information Transmission - Modulation & Noise - MGH, 1970.
3. Gruenberg E L - Handbook of Telemetry and telecontrol - MGH, 67
4. Carley B A - Communication system - Introduction to signals and noise in electrical communications - MGH, Int. student. Edn.
5. D Patranabis - Telemetry principles - Tata McGraw Hill.

COMPUTER COMMUNICATION

Code: EC-802(c)

Contacts: 3L

Credits: 3

Data transmission principles, transmission components; ASK PSK, FSK, QPSK, O-QPSK, QAM, M-ary digital modulation; data compression; modems principles 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, codes, concentrators etc; facsimile transmission, electronic mail, voce mail, internet working; case study of computer communication networks. Different LAN standards, Wireless LAN. Introduction to Broadband, ATM and ISDN network.

Books:

1. J R Freer - Computer Communication and Network - East West Press, 1990
2. F Halsall - Data Communication Computer Networks and OSS - Pearson Education
3. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
4. J Martin - Telecommunication and the Computer 3rd Edn. - PHI, 1992.
5. Miller, Data Network Communication, Vikas
6. A Tanenbaum - Telecommunication Network - Pearson Education /PHI.
7. W Stallings - Data and Computer Communication - Pearson Education/PHI
8. W Stallings - ISDN and introduction - Pearson Education/PHI
9. T Viswanathan - Telecommunication Switching Systems and Networks - PHI, 1992.
10. B G Lee, M Kand & J Lee - Broadband Telecommunication Technology - Artech House, 1993.

Electrical Engineering Syllabus Old

AI & NEURAL NETWORKS

Code: CS-802(d)

Contacts: 3L

Credits: 3

Machine Learning & AI - Introduction, hierarchical perspective and foundations. Rote Learning, Learning by advice, Learning in problem solving inductive learning, explanation based learning, learning from observation and discovery, learning by analogy, introduction to formal learning theory.

Biological neurons and brain, models of biological neurons, artificial neurons and neural networks, Early adaptive nets Hopfield nets, back error propagation competitive learning lateral inhibition and feature maps, Stability - Plasticity and noise saturation dilemma, ART nets, cognition and recognition.

Neural nets as massively parallel, connectionist architecture, Application in solving problems from various are as e.g., AI, Computer Hardware, networks, pattern recognition sensing and control etc.

Books:

1. P H Winston - Artificial Intelligence - Pearson Education
2. Bishop, Neural Networks for Pattern Recognition, OUP
3. Cohen, Empirical Methods for AI, PHI
4. Haykin, Neural Network, Pearson Education/PHI
5. E Charniak and W Midermott - Introduction to Artificial Intelligence - Pearson Education.
6. Hagan, Neural Network Design , Vikas
7. Shivanandan, Artificial Neural Network, Vikas
8. Bose - Neural Network Fundamentals with graphs, Algorithms and Applications - TMH.

PROBABILITY AND STATISTICS

Code: M-802(e)

Contacts: 3L

Credits: 3

Probability:

Theory of Probability, Axiomatic approach of Probability, Random Experiments, Sample Space, Events, Mathematical Expectation and Generating Functions, Covariance, Characteristic functions and properties, Multivariate characteristic functions, Tchebychev's inequality, convergence in Probability, Weak law of large numbers, Borel Cantelli Lemma, Markov chains.

Statistics:

Sampling Theory: Types of sampling, Parameter and Statistics, Null Hypothesis, Sampling Distributions - Chi Square Distribution, t, F and Z Distributions.

Estimation Theory: Statistical Inferences, Curve Fitting, Regression and Correlation, Method of Last Squares, Multiple Regression, Standard Error Estimate, Probability Interpretation of Regression and Correlation, Sampling Theory of Regression and Analysis of Variance.

Books:

1. Gupta S C Kapoor V K: S C and Kapoor V K: Fundamentals of Mathematical Statistics - Sultan Chand & Sons.
2. Lipschutz S: Theory and Problems of Probability (Schaum's Outline Series) - McGraw Hill Book Co.
3. Rao B, Probability & Statistics for Engineers, Scitech
4. Trivedi, Probability & Statistics, PHI
5. Gupta, Statistical Methods, Vikas
6. Spiegel M R: Theory and Problems of Probability and Statistics (Schaum's Outline Series) - McGraw Hill Book Co.
7. Goon A M, Gupta M K and Dasgupta B: An Outline of Statistical Theory - Vols.1 & II - The World Press Pvt. Ltd.
8. Walpole, Probability & Statistics, - Pearson Education

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PROJECT MANAGEMENT & OPERATIONS RESEARCH

Code: M-802(f)

Contacts: 3L

Credits: 3

Project formalities - feasibility study 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 numbers, flow-chart development, Inventory Control-introduction, costs, deterministic and stochastic models, buffer stocks.

Books:

1. Hiller - Introduction to Operation Research 6th Edn. - TMH
2. A Ravindran - Introduction to Operation Research - John Wiley, 1993.
3. Panneerselvam, Production & Operations Management, PHI
4. Taha - Operation Research, Pearson Education/PHI
5. Kalavathy, Operation Research, Vikas
6. Patel, Project Management, Vikas
7. Juran - Quality Planning & Analysis 3rd Edn. - MGH
8. R Kapoor - Computer Assisted Decision Models - TMH, 1991
9. P Iyer - Engineering Project Management - Wheeler
10. Adam & Ebert - Production & Operations Management: Concepts, Models and Behaviour 5th Edn. – PHI/ Pearson Education.

ASSIGNED PROJECT

Code: EE-893

Contacts: 12P

Credits: 8

Project work assigned to the students by the teachers or selected by students and approved by teachers on current engineering problems of industrial use.