## COURSE STRUCTURE FOR B.TECH IN ELECTRICAL ENGINEERING

### 3RD SEMESTER

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| 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**|
|                                              | **TOTAL of Semester :**                     |    |    |         | **34**|

### FOURTH SEMESTER

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<td>Electrical Machines</td>
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| B. PRACTICAL:                           |                                             |    |    |         |       |
|-----------------------------------------|---------------------------------------------|    |    |         |       |
| 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**|

| C. SESSIONAL:                           |                                             |    |    |         |       |
|-----------------------------------------|---------------------------------------------|    |    |         |       |
| HU 481 Technical Report writing & / Language Practice Lab | 0  | 0  | 0     | 3     | 2     |
|                                              | **TOTAL OF SESSIONAL**                      |    |    |         | **3** |

**TOTAL:** **33** **28**
## Electrical Engineering Syllabus Old

### FIFTH SEMESTER

#### A. THEORY

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#### B. PRACTICAL

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#### TOTAL SESSIONS:

30 26

### SIXTH SEMESTER

#### C. THEORY

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TOTAL OF THEORY 19 19
## Electrical Engineering Syllabus Old

### D. PRACTICAL

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### C. SESSIONALS

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6-week Industrial Training during summer vacation

### SEVENTH SEMESTER

#### A. THEORY

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<td>3 0 0</td>
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<td>HU-701</td>
<td>Financial Management &amp; Accounts</td>
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<td>Multimedia Systems</td>
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#### B. PRACTICAL

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#### C. SESSIONAL

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#### TOTAL OF SEMESTER

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
## EIGHTH SEMESTER

### D. THEORY

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### E. PRACTICAL

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### F. SESSIONAL

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### TOTAL OF SEMESTER

|          |           |           |       |       |       |       |
|          |           |           |       |       |       |       |
|          |           |           |       |       |       |       |
|          |           | **27**    | **26**|       |       |       |

### 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)
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.

Textbooks:

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
5. A. Chakravarty: Networks, Filters & Transmission Lines
6. D. Chattopadhyay and P.C. Rakshit: Electrical Circuits
7. A.V. Oppenheimer and A.S. Wilsky: Signals & Systems, PHI
9. Sivanandam: Electric Circuits Analysis
10. Gupta: Circuit Analysis with Computer Application, New Age International
14. Wadhwa: Network Analysis & Synthesis, New Age International
15. Roy Chowdhury: Linear Integrated Circuits, New Age International
17. V.K. Chandna, A Text Book of Network Theory & Circuit Analysis, Cyber Tech

References:


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...
Electrical Engineering Syllabus Old

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:
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
9. Sutko: Industrial Instrumentations
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.


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.
Electrical Engineering Syllabus Old

Text books:
1. Data Structures and Algorithms – O.G. Kakde and U.A. Deshpande, ISTE/EXCEL BOOKS
3. Drozdek A –Data Structures and Algorithms
5. Ajay Agarwal- Data Structure Through C, Cyber Tech

References:
2. Data Structures Using C – M.Radakrishnan and V.Srinivasan, ISTE/EXCEL BOOKS
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.
**Electrical Engineering Syllabus Old**

*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.


**Text Books:**


**Reference Books:**


**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).

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

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

Total 48L

Text Books:
1. Rathor, Choudhari,: Descrete Structure And Graph Theory.
10. West D.B.: Introduction to Graph Theory - Prentice Hall
11. Deo N: Graph Theory with Applications to Engineering and Computer Science - Prentice Hall.
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
22. Chowdhury: Elements of Complex Analysis, New Age International
23. Bhat: Modern Probability Theory, New Age International
26. Dhami: 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;
Electrical Engineering Syllabus Old

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:

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
7. Numerical Methods (Problems and Solution) by Jain, Iyengar , & Jain
12. Numerical Methods for Engineers – Gupta, New Age International
18. Applied Discrete Structures – Joshi, New Age International

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
Electrical Engineering Syllabus Old

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 electrodynamometer 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
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 Algebric Equation: Bisection, Secant, Regular-falsi, Newton Raphson
5. Assignments on Ordinary Differential Equation: Taylor Series, Euler’s method, Runga-Kutta
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.


**Text:**
1. Nagrath I.J. & Kothari D.P. : Electric Machines, TMH
2. Bhattacharya—Electrical Machines,2/e,TMH

**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

Electrical Engineering Syllabus Old

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


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:
2. Franco—Design with Operational Amplifiers & Analog Integrated Circuits , 3/e, TMH
4. Gayakwad R.A -- OpAmps and Linear IC’s, PHI

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.
5. Boyle’stead & Nashelsky: Electronic Devices & Circuit theory, PHI.
6. Millman & Halkias: Basic Electronic Principles; TMH.

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, EBDIC, 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- Morries Mano, PHI.

Reference:
3. Digital Technology- Virendra Kumar, New Age.

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, Stocke’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.


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. Edninister-- Electric Circuits, 3/e (Schaum Series ) , TMH
3. Edninister—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.


Text:
1. P.K.Nag- Engineering Thermodynamics – TMH ,2/e
2. P K Nag- Power Plant Engg. - TMH Pub

Reference:
1. Cengel --- Thermodynamics , 3/e ,TMH
2. Et-Wakil—Power Plant Engineering , MH

ELECTRICAL MACHINES LAB
Code: EE 491
Contacts: 3 P
Credit: 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)
7. Polarity test on single phase transformers and study of the different connections of three-phase transformer.

ANALOG ELECTRONIC CIRCUITS LAB
Code: EC491
Contacts: 3 P
Credits: 2

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

5. Realization of current mirror & level shifter circuit using Operational Amplifiers.
9. Construction of a simple function generator using IC.
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.
5. Design of combinational circuit for BCD to decimal conversion to drive 7-segment display using multiplexer.
13. Design of Sequential Counter with irregular sequences.
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 & Willecox 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.


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.


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
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, ARAMATURE 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;
- 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.


**BOOKS:**

4. Saadat: Power System Analysis, TMH
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.


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
Electrical Engineering Syllabus Old

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

POWER ELECTRONICS

Code : EE 504
Contacts : 3L  + 1T
Credits :4


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.


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
5. Dubey S K – Thyristorised Power Controller; John Wiley & Sons
7. Dewan S B & Stranghen A – Power Semiconductors circuit
11. Subramanyam: Power Electronics, 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:
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

ELECTRICAL MACHINES LAB
Code : EE 591
Contacts : 3 P
Credit : 2

LIST OF EXPERIMENTS

1) DIFFERENT METHOD OF STARTING OF 3 PH PHI SQUIRREL INDUCTION MOTOR & THEIR COMPARISON [ D.O.L,AUTO TRANSFORMER & STAR-DELTA].
2) SPEED CONTROL OF 3 PH 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, SETTING 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 TRIGERRING CIRCUITS FOR THYRISTOR.
4. STUDY OF UNI- JUNCTION TRANSISTOR (UJT) TRIGERRING 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.

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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:
2. Clayton A E & Hancock N N : The Performance and Design of Direct Current Machines ; CBS Publishers and Distributors
5. Norton, Machine design, Pearson Education

**POWER SYSTEM**  
**Code : EE 602**  
**Contacts : 3L + 1T**  
**Credits :4**


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.


**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
8. Electrical Transmission & Distribution Reference Book; Westinghouse
12. M A Pai – ComputerTechniques & Power systems
13. Jayachrista, Power System Analysis,Scitech

**CONTROL SYSTEMS**  
**Code : EE 603**  
**Contacts : 3L + 1T**  
**Credits :4**


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

Introduction to Optimal Control – quadratic index and regulator problems.
Logic control – digital and computer control.

**BOOKS :**
3. Ogata K : Modern Control Engg. – PHI/ Pearson Education
4. Bandopadhyaya,Control Engg., PHI
5. Stefani, Design of feedback Control System,OUP
7. Goodwin, Control System Design, Pearson Education
8. Ramakalyan, Control Engineering, Vikas
9. Lyshevski, Control System Theory withEngineering Applications, Jaico
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 :**
4. Borole, 8085 Microprocessor, Jaico
6. Short, Microprocessors & Programmed logic, Pearson Education
7. Mathivanam, Microprocessor, PHI
10. Chowdhury & Chowdhury – Microprocessors, Scitech
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.


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
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
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.
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 Magnatisation Characteristics Test of CT & PT
3. Testing on (i) Under Voltage Relay and (ii) Earth Fault Relay
4. Study on D C Load Flow
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 (date 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 programs 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


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.


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:
2. De N K and Sen P K : Elective Drives; PHI
4. Krishnan, Electrical Motor Drives, Pearson Education
5. Elsharwaki, Electrical Drives, Vikas
6. De, G : Electrical Drives and their Control; Academic Books Ltd.

FINANCIAL MANAGEMENT AND ACCOUNTS

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

Introduction [3L]

Capital Budgeting [7L]

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:
3. Advanced Management Accounting - Kaplan & Atkinson, PHI.
5. Financial Mgmt Accounting, Gupta, Pearson
6. Financial Mgmt, I.M. Pandey, Vikas
7. Financial Mgmt., Khan & Jain, TMH
8. Financial Mgmt., Mcmenamin, OUP
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


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.


**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:**

2. Halsall,Multimedia Communication, Pearson Education
5. Andleigh & Thakrar, Multimedia Systems, PHI

**References:**

2. Jeff Burger - "Multimedia for decision makers: a business primer", Pearson Education,
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) 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.
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
5. A T Dover - Electric Traction

**ILLUMINATION TECHNOLOGY**

*Code: EE-702 (b)*

*Contacts: 3L*

*Credits: 3*


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:**

2. Wadha C L: Generation, Distribution and Utilization of electrical energy - New Age International Ltd.
3. Singh, Electric Power Generation, Transmission & Distribution, PHI

**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

3. Doland - "Hydro Electric Power Engineering" - Rowland Press

**HIGH VOLTAGE ENGINEERING**

**Code:** EE-702(d)  
**Contacts:** 3L  
**Credits:** 3


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:**

3. Razevig D V - High Voltage Engg., Khanna 1972  
5. Meek J M - High Voltage Laboratory Technique, 1954  

**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:**

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.


Books:

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; SO₂; NOₓ; 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.
3. Johnson C: Process Control Instrumentation Technology; PHI/Pearson Education
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 forms; Energy from Biomass - gasifiers and bio-gas reactors; Tidal energy; Wave energy and Geothermal energy; Environmental effects and Economics of NCES.

Books:
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.
7. Study of permanent magnet synchronous motor drive fed by PWM Inverter 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).
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 |
| Thermoeomf 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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Smart sensors</td>
<td>2</td>
</tr>
<tr>
<td>Humidity, pH, conductivity</td>
<td>1</td>
</tr>
<tr>
<td>Velocity, Acceleration:</td>
<td>1</td>
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<tr>
<td>Electromagnetic velocity sensor; spring-mass-system, measurement of</td>
<td>1</td>
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<tr>
<td>deflection</td>
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<tr>
<td>principle of accelerometers, sensitivity, noise</td>
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<td>Flow:</td>
<td>4</td>
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<tr>
<td>Pressure gradient technique; (orifice, venture, pitot,) rotameter</td>
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<tr>
<td>thermal transport technique; electromagnetic sensor, laser doppler</td>
<td></td>
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<tr>
<td>anemometry; ultrasonic sensors</td>
<td></td>
</tr>
</tbody>
</table>

#### Books:
- D Patranabis, Sensors and Transducers, PHI, 2nd ed.
- 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:**
3. Power Plant Engineering - Morse
4. Power Plant Engineering - Domkundwar
Electrical Engineering Syllabus Old

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

REFERENCES:
1. Power Plant Engineering - Gaffert
3. Modern Power Plant Engineering - J. Weisman, R. Eckart
4. Power Station Engineering & Economy - Skrotzki
5. The Elements of Nuclear Power - Bennet, Thomson
7. Modern Power Station Practice: VoL 1 to 8 - British Electricity Intl., London -Paragamon Press
8. Power Station engineering & Economy – Skrotzki, Vopat - TMH

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.

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

**Books:**


### 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 break-even 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:**

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
6. Production & Operations Management – Adam, Pearson Education /PHI
7. Industrial Relations, Trade Unions & Labour Legislation - Sinha, Pearson Education Asia

### ELECTIVE-III

**COMPUTER AIDED POWER SYSTEM STUDIES**

**Code:** EE-801(a)  
**Contacts:** 3L  
**Credit:** 3


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:**
2. Elgard O I: An Introduction to Electrical Energy System Theory; TMH
4. Wood & Wollenberg: Power Generation Operation and Control;
5. Stagg & Elabid - Computer Methods in Power System
6. M A Pai - Computer Technique in Power Systems

**OPTIMISATION TECHNIQUES**

**Code:** EE-801(b)

**Contacts:** 3L

**Credits:** 3


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
8. Rao S S: Engineering Optimization (3rd Ed); New Age Int. (P) Ltd.

**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
Electrical Engineering Syllabus Old

10. M J Quinn - Design of efficient - algorithms for parallel computer
11. D J Evans (Ed) - Parallel processing systems, Cambridge University Press, 1982

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, Microprogrammed 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:
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:
2. Tau J.: Modern Control Theory; McGraw Hill
4. Anderson & Moore, Optimal Control, PHI
5. Glad, Control Theory, Vikas
7. Boltianskii V G; Gamkrelidge R V; Pontryagin L S; On the theory of Optimal process

ENERGY MANAGEMENT AND AUDIT

Code: 801(f) Contacts: 3L
Credits: 3


Books:
1. Albert : Plant Engineers & Managers Guide to Energy Conservation

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 and FM and pulse modulation over different transmission channels.


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

Books:
2. G. Kennedy - Electronic communication Systems - TMH
4. Hancock - An introduction to the Principles of Communication Theory - TMH
Electrical Engineering Syllabus Old

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

REMOTE CONTROL & TELEMETRY
Code: EI - 802(b)
Contacts: 3L
Credits: 3


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:
3. Gruenberg E L - Handbook of Telemetry and telecontrol - MGH, 67

COMPUTER COMMUNICATION
Code: EC-802(c)
Contacts: 3L
Credits: 3

Data transmission principles, transmission components; ASK PSK, FSK, QPSK, O-QPSK, QAM, M-cry 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; fascimile 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:
2. F Halsall - Data Communication Computer Networks and OSS - Pearson Education
3. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
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
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.
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:

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:
4. Trivedi, Probability & Statistics, PHI
5. Gupta, Statistical Methods, Vikas
8. Walpole, Probability & Statistics, - Pearson Education
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.


Books:
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
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.