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<th>Sr. No</th>
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Note: Practical/Oral is based on Term Work.
202001: Power Plant Engineering

Teaching Scheme
Lectures: 4 Hrs / week  
Practical: 2 Hrs / week

Examination Scheme
Paper: 100 Marks  
Term Wok: 50 Marks

Unit 01  Fuels and Combustion:  
Thermodynamic cycle of steam flow; Rankine cycle; Actual Rankine cycle; Reheat cycle; Carnot cycle, heat rate.  
Classification of fuels; calorific value and its determination; combustion chemistry; Bomb calorimeter; Boy’s gas calorimeter; combustion equation; stoichiometric air fuel ratio; excess air requirement; actual air fuel ratio; flue gas analysis; pulverized coal firing system; fluidized bed combustion.

Unit 02  Thermal Power Plants:  
Types of boilers, Feed water and its treatment, Steam turbine and alternators.  
Site selection, Main parts and its working.  
Fuel Handling: delivery of load, unloading, preparation, transfer, outdoor (dead) storage, indoor (live) storage, In plant Handling, Coal weighing.  
Ash disposal and dust collation: Draught systems, electrostatic precipitator  
Prospectus and development of thermal plants in India

Unit 03  Hydro Power Plant:  
Site selection, Hydrology, storage and pondage, general arrangements and operation of hydro power plant, Hydraulic turbines, turbine size, pelton wheel turbine, Francis and Kaplan turbines, selection of turbines, Dams, Spillways, gates, intake and out take works, canals and layout of penstocks, water hammer and surge tank, simple numerical on hydrographs and number of turbine required  
Prospectus and development of hydro plants in India

Unit 04  Nuclear power plant:  
Introduction, atomic physics, nuclear reaction, materials, site selection, nuclear reactors and working of each part, classification of nuclear reactor, nuclear waste disposal, plant layout, Prospectus and development of nuclear plants in India  
Diesel Power Plants:  
Introduction, Site selection, Main components and its working, Diesel plant efficiency and heat balance, choice and characteristic of diesel power plant.

Unit 05  Gas power plant:  
Simple gas turbine power plant, methods to improve thermal efficiency, open loop and closed loop cycle power plants, gas fuels, gas turbine materials, plant layout.  
Non-conventional power plant:  
Sources, MHD plants, solar energy, fuel cells, tidal power generation, geothermal power generation, wind power stations, Prospectus and development of non conventional power plants in India  
Comparison of all power plants
Unit 06  **Economics Aspects of Power Generation:**  
Introduction, terms commonly used in system operations, factors affecting cost of generation, reduction of cost by interconnecting generators, choice of size and number of generator units, Input output curves of thermal and hydropower plants, Incremental fuel rate curves, incremental fuel cost curve, constrints on economic generation, economic loading of generators, load allocation among various generators, base load and peak load plants.

**Practicals:** The term work shall consist of a record of any eight of the following:

1. Study of boiler mounting and accessories.
2. Study of modern thermal power plant.
3. Demonstration and study on diesel engine.
4. Demonstration and study on diesel power plant.
5. Study of modern hydro electric power plant.
6. Demonstration and study of solar photo voltaic system.
7. Demonstration and study of any water turbine.
8. Demonstration and study of a centrifugal pump.

**Text Books**

2. Dr. P. C. Sharma: Power Plant Engineering ,
3. Chakrabarti, Soni, Gupta, Bhatnagar ”A text book on power system Engineering” Dhanpat Rai publication
4. R.K.Rajput, “Power Plant Engineering”
5. J B Gupta, , “Power Plant Engineering”

**Reference Books**

1. Arora and Domkundwar: A course in Power Plant Engineering , Dhapat Rai  publication
2. S. P. Sukhatme : Solar Energy
207003 ENGINEERING MATHEMATICS – III (2008 Course)

Teaching Scheme:
Lectures: 4 hrs./week

Examination Scheme:
Paper: 100 marks
Duration: 3 hrs.

SECTION I

Unit I: Linear Differential Equations (LDE) (09 Hours)
Solution of n\textsuperscript{th} order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy’s & Legendre’s DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits.

Unit II: Complex Variables (09 Hours)
Functions of Complex Variables, Analytic Functions, C-R Equations, Conformal Mapping, Bilinear Transformation, Cauchy’s Theorem, Cauchy’s Integral Formula, Laurent’s Series, Residue Theorem

Unit III: Transforms (09 Hours)

SECTION II

Unit IV: Statistics and Probability (09 Hours)
Measures of Central Tendency, Standard Deviation, Coefficient of Variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression Estimates.

Unit V: Vector Differential Calculus (09 Hours)

Unit VI: Vector Integral Calculus (09 Hours)
Line, Surface and Volume integrals, Work-done, Green’s Lemma, Gauss’s Divergence Theorem, Stoke’s Theorem, Applications to Problems in Electro-Magnetic Fields.

Text Books:

Reference Books:
203141: Material Science

Teaching Scheme
Lectures: 4 Hrs / week
Practical: 2 Hrs / week

Examination Scheme
Paper: 100 Marks
Duration : 3 hrs
Term Work: 50 Marks


08 hrs

Unit 02 A) Insulating Materials, Properties & Application:

08 hrs

Unit 03 Magnetic Materials:

06 hrs

Unit 04 Conducting Materials:

06 hrs
Unit 05  Nanotechnology: 08 hrs

Unit 06  Testing Of Materials: 08 hrs
5. Measurement of P.F. and partial discharge of high voltage cables.
6. Testing of high voltage bushing.
7. Measurement of Flux Density by Gauss-meter

List of Experiments:
At least two experiments should be designed by the faculty members and can be included in the term work apart from the experiment list given below. SIX experiments from the list below and remaining two from the experiments designed and set up by the faculty member will form part of term work.

1. To measure electric strength of solid insulating materials as per IS 2584
2. To measure electric strength of liquid insulating materials as per IS 6798.
3. To measure electric strength of gaseous insulating materials using Sphere Gap-Unit.
4. To obtain Hysteresis Loop of the Ferro-Magnetic Material.
5. To understand the principle of thermocouple & to obtain characteristics of different thermocouples.
6. To measure Insulation Resistance & KVAR capacity of power capacitor.
7. To measure Resistivity of High Resistive Alloys.
8. To observe development of tracks due to ageing on different insulating materials e.g. Bakelite, Perspex, Mica, Micanite, Fiberglass etc.
9. Testing of Cables as per IS 6380, 6474.
10. Measurement of Tangent of Dielectric Loss Angle (tan δ) by Schering Bridge
11. Measurement of Flux Density by Gauss-meter

Industrial Visits: Minimum one visit should be arranged to an industry related to material science. A hand written report should be submitted by every student as part of term work.

Text Books:
4. Nanotechnology - A gentle introduction to next big idea by Mark Ratner & Daniel Ratner, Pearson Education
5. Introduction to Nanotechnology by Charles P. Poole, Jr. Frank & J. Ownes (Wiley Student Edition)

**Reference Books:**
## 203142: Analog and Digital Electronics

### Teaching Scheme
- Lectures: 4 Hrs / week
- Practical: 2 Hrs / week

### Examination Scheme
- Paper: 100 Marks
- Duration: 3 hrs
- Practical: 50 Marks

### Unit 01
BJT amplifier with reference to operational analysis of CE, CB and CC configuration, their input-output characteristics, AC-DC load line analysis, Class A, amplifier. Multistage BJT amplifier-direct, RC coupled and transformer coupled, Darlington pair, Push-Pull amplifier and differential amplifier FET-construction, Parameters, Characteristics. **08 hrs**

### Unit 02
Op-Amp : Block diagrams of 741 and 324 , ideal and practical parameters open loop and close loop configuration of Op-Amp. Applications of Op-Amp, Integrator, differentiator, Comparator, Schmitt trigger, instrumentation amplifier, precision rectifiers, zero crossing detectors, V-I and I-V converters **08 hrs**

### Unit 03
Waveform generation using Op-amp - sine, square, saw tooth and triangular generator, peak detector, IC 555 -construction, working and modes of operation - astable, monostable and multivibrators, Sequence generator, voltage regulators using ICs Viz. 78xx, 79xx, LM 317, Active filters-Its configuration with frequency response, Analysis of first order low pass and high pass filters **06 hrs**

### Unit 04
Numbering Systems and Boolean algebra- numbering systems-binary, octal, decimal and hexadecimal and their conversion, codes-BCD, Grey and excess3, Binary arithmetic:- addition and subtraction by 1’s and 2’s compliment. Revision of logic gates, Boolean algebra, De-morgon’s theory etc. K-map: - structure for two, three and four variables, SOP and POS form reduction of Boolean expressions by K-map 1-bit comparator analysis using K-map **08 hrs**

### Unit 05
Flip flops - R-S, Clocked S-R, D latches, Edge triggered D flip-flops, Edge triggered JK flip flops, JK Master - slave flip flop, Registers and Counters, Buffer registers, shift registers, controlled shift registers, asynchronous counters, synchronous counter, twisted ring counters, N - module counters. **08 hrs**

### Unit 06
Multiplexer, Demultiplexer using K-map, ADC, Dual slope SAR, DAC-binary weighted, ladder type, Memories: RAM-static& dynamic, ROM, PROMS and EPROMS, EEPROMS detailing. **06 hrs**

### Lab Experiments:
Minimum 10 experiments to be conducted.

1. Transistor amplifiers: frequency response of BJT, multistage BJT amplifier and FET amplifier.
2. Op-amp as square, sine and triangular wave generator.
3. Op-amp as ZCD, Comparator and Schmitt trigger.
4. Instrumentation amplifier using 3 - op amp CMR measurement and precision rectifier
5. IC-555 applications- astable, monostable, sequence counter.
6. Study and verify shift register operation (IC 7495) and application of 7495 as pseudo random no. generation
7. Voltage regulation of IC VR 78xx, 79xx and LM317
8. Study of counters, ring counter and twisted ring counter.
9. A to D and D to A converter using ADC 0809 and DAC 0808.
10. Study of up - down counters (IC 74192/74193) and N- modulo counter. (IC 7490/7493).
11. Study of various flip-flops and verification of truth table.
12. Study of Multiplexer and Demultiplexer.
13. Study of active filters - Low pass and high pass filters.

Text Books:
3. Electronics Devices & Circuits by Mottershed, PHI New Delhi
6. Introduction to Electronics for Engineers and Scientists by Raja Raman, Vishwanathan and Mehata.

References Books:
1. Operational Amplifier by Gaikwad R. PHI New Delhi

B) Essentials of indicating instruments: deflecting, controlling and damping systems. Construction, working, torque equation, various advantages and disadvantages of MI (attraction and repulsion), and PMMC.


Unit 02  A) Measurement of Resistance : Measurement of low, medium and high resistance. Kelvin’s Double Bridge, Ammeter-Voltmeter method, Megger, Earth tester for earth resistance measurement, measurement of insulation resistance when power is ON.


Unit 03  A) Wattmeter theory and measurement of power: Construction, working, torque equation, errors and their compensation, advantages/disadvantages of dynamometer type wattmeter, low power factor wattmeter, poly-phase wattmeter. Power measurement in three phase system. Power measurement in three phase system for balanced and unbalanced load using three wattmeter method, two wattmeter method. Modification of two wattmeter method by single wattmeter & two way switch, measurement of reactive power, determination of power factor of the load and its nature in terms of two wattmeter readings

B) Special purpose measuring instruments: Block diagram and operation of digital meters: Power factor meter, frequency meter, Power analyzer, tri-vector meter, TOD meter, multi meter.
Unit 04 A) **Energy meter theory**: Construction, working, torque equation, errors and adjustments of single phase conventional (induction type) energy meter, Block diagram and operation of electronic energy meter. Three-phase energy meters.

B) **Instrument Transformers**: Construction, connection of CT & PT in the circuit, advantages of CT / PT over shunt and multipliers for range extension, transformation ratio, turns ratio, nominal ratio, burden etc, ratio and phase angle error. (No derivation of formulae is expected)

Unit 05 A) **Oscilloscope**: Introduction, various parts, front panel controls, block diagram of dual trace and dual beam CRO, use of CRO for measurement of voltage, current, period, frequency, phase angle & frequency by lissajous pattern.

B) **Transducers**: Introduction, classification, basic requirements, types: Resistive, inductive, Capacitive (brief treatment only), advantages of electrical transducers.

C) **Pressure measurement**: Introduction, classification of pressure as low / medium / high, absolute / guage / vacuum, static / dynamic & head pressure.

   High pressure measurement using electric methods, low pressure measurement by McLeod guage and pirani gauge, capacitive pressure transducer.

Unit 06 A) **Flow measurement**: Introduction, types of flow, flow measurement methods / meters: Nozzle, Orifice, Venturi-meter, Pitot tube, Rotameter, electromagnetic flow meter, ultrasonic flow meter, hot wire meter

B) **Level measurement**: Introduction and importance of level measurement, level measurement methods: mechanical, hydraulic, pneumatic, electrical, nucleonic, ultrasonic.

C) **Displacement measurement**: LVDT - construction, working, application, null voltage, specifications, advantages / disadvantages, effect of frequency on performance. RVDT. Strain Gauge: Introduction, definition of strain, types of strain gauge: Wire strain gauge, foil strain gauge, semiconductor strain gauge etc; their construction, working, advantages and disadvantages. Construction, working and application of load cell.

List of Experiments:
The term work shall consist of any 8 experiments from above list, out of which last experiment is compulsory.

1. Measurement of power in three phase circuit using two wattmeter method (Balanced & Unbalanced Loads)
2. Measurement of Reactive power in three phase balanced circuit using one wattmeter method and by one wattmeter method with two way switch.
3. Calibration of Single phase or Three phase static energy meter at different power factors using Digital meters.
6. Earth resistance measurement by Earth Tester.
7. Electrical methods for measurement of liquid level.
8. Displacement measurement by LVDT.
9. Determination of characteristics of various pressure Transducers.
10. Extension of instrument range: ammeter, voltmeter, watt meter using CT / PT.
11. Measurement of power in three phase four wire using three CTs and Two wattmeters.
12. Study and use of CRO for measurement of Current, Voltage, Time period, Frequency, Phase angle.

Text Books:

1. A Course in Electrical and Electronic measurements & Instrumentation – by A. K. Sawhaney, Dhanpat Rai & Sons

Reference Books:

2. Electonic measurement and instrumentation by Dr. Rajendra Prasad, Khanna Publisher, New Delhi.
4. Introduction to Measurements and instrumentation by Anand PHI Publication.
TERM WORK

A. Following termwork should be covered by giving demonstration of different machine tools and metrology instruments.

1. Study and working of machine tools - Lathe, milling and drilling etc.
2. Study of casting process.
3. Study of welding and joining processes.
4. Study of metrology and measuring instruments such as
   i) Linear use of micrometer/ vernier/ dial gauge,
   ii) Angular use of sine bar and slip gauges,
   iii) Surface roughness measurement.

Students should submit assignments based on the above topics

B. Term work consisting of job on following processes:

1. Plain and taper turning : 1 job
2. Welding / Soldering : 1 job
3. Sheet metal working : 1 job

Sketches of jobs along with operation sequence should be submitted by each student

List of Books:

1. Manufacturing Technology by P.N.Rao., Volume I & II
2. Workshop Technology by Hazara Choudhary, Volume I & II
Unit 01  **A) Load curve**, load duration curve, different factors connected with generating stations such as load factor, demand factor, diversity factor, plant capacity factor, annual plant use factor. Concept of base load and peak load stations and interconnected operation. Fitting of available stations into the area load duration curve.


Unit 02  **A) Major Electrical equipments in Power Stations**: Descriptive treatment of ratings, Special features, field of use of equipments like alternators, transformers, bus-bars exciters and excitation systems, voltage regulators, switches and isolators, reactors, carrier current equipments (F.L.C.C.), Control panels, metering and other control room equipments in generating stations.

**B) Overhead line insulators**: Types of insulators, pin type, suspension type, strain type insulators, voltage distribution along string of suspension insulators, string efficiency, Equalization of potential across each unit.

Unit 03  **Constants of Transmission Line**: Inductance, Resistance of line, skin effect and its effects, proximity effect, inductance of single phase two wire line, flux linkage of one conductor of one group, inductance of composite conductor line, concept of G.M.R. and G.M.D, inductance of three phase line with equilateral spacing, inductance of parallel circuit three phase line, three phase line with equilateral spacing, unsymmetrical spacing, double circuit three phase line, Calculation of inductance to be done with and without transposition.

Unit 04  **Constants of Transmission line: capacitance**: Concept of G.M.R. and G.M.D for capacitance calculations, capacitance of three phase line with equilateral spacing, capacitance of parallel circuit three phase line with equilateral spacing, unsymmetrical spacing, double circuit three phase line, capacitance of single phase line with earth effect and without effect of earth’s surface on electric field, calculation of capacitance to be done with and without transposition.

Unit 05  **A) Circuit Representation of Lines and generalized Circuit Constants**: Classification of lines based on length as short, medium and long lines. Ferranti Effect Representation of lines as ‘Pi’ and ‘Tee’ circuits using R,L and C parameters voltage and current relations for short and medium lines only. Representation of ‘Tee’ and ‘Pi’ models of lines as two port networks, evaluation and estimation of ABCD constants for both the models.

**B) Long transmission line**: Current and voltage relationship, Hyperbolic equations, equivalence circuit.
Unit 06  A) Mechanical design of overhead lines: Line supports, spacing between the conductors, length of span, calculation of sag, equal and unequal supports, effect of ice and wind loadings.

B) Underground Cable: Classification, Construction of cable, XLPE cables, insulation resistance, capacitance, dielectric stress in single core/multi core cables, cable faults and location of faults.

Industrial visits:
Minimum one visit to a generating station and/or HV/EHV substations is recommended.

Text Books:

Reference Books:
1. Elements of Power Station Design by M.V. Deshpande, Wheeler Publishing.
5. Websites of MERC and MSEDCL
203145: Electrical Machines-I

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<td>Paper: 100 Marks</td>
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<td>Practical: 2 Hrs / week</td>
<td>Duration: 3 hrs</td>
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Prerequisite: Single phase transformer: Constructional details, Arrangement of cores and coils in shell-type and core type transformers. Material used for magnetic cores, windings and insulation.

Unit 01  Transformers: 08 hrs

- Single phase Transformer: Concept of leakage flux and its effects, resistance, leakage reactance and leakage impedance of transformer windings & their effects on voltage regulation and efficiency.
- Exact and approximate equivalent circuits referred to either side. General phasor diagrams on no-load and on load. Various losses in a transformer, their variation with load. Efficiency, maximum efficiency, transformer ratings.
- Open circuit and short circuit tests, determination of equivalent circuit parameters from the test data. Polarity test, Determination of voltage regulation and efficiency from equivalent circuit.
- Autotransformers and dimmerstats, their ratings and applications. Comparison with two winding transformer with respect to saving of copper and size.

Unit 02  Parallel operation of single phase transformers, conditions to be satisfied, 06 hrs

- Load sharing under various conditions.
- Three phase transformers: Standard connections of three phase transformers and their suitability for particular applications, voltage phasor diagrams and phasor groups.
- Descriptive treatment of Parallel operation of three phase transformers Scott connection and V connections. Three winding transformers- tertiary windings.

Unit 03  D.C. Machine: 08 hrs

- Construction, main parts, magnetic system, poles, yoke, field winding, armature core, typical flux path, Armature winding: Simple lap and wave winding, commutator and brush assembly.
- Generator action, e.m.f equation, magnetization curve, motor action of a DC machine. Types of DC motors, torque equation, significance of back e.m.f. working at no-load and on-load. Power flow diagram, losses and efficiency.
- Descriptive treatment of armature reaction.

Unit 04  Characteristics and applications of D.C. Shunt and D.C. Series Motors, 08 hrs

- Starting of DC motors, study of starters for series and shunt motor, solid state starters, speed control of various types of DC motors.
- Commutation: Process of commutation, time of commutation, reactance voltage, straight line commutation, commutation with variable current
density, under and over commutation, causes of bad commutation and remedies, interpoles, compensating windings. (Descriptive treatment only)

**Unit 05  Basic Theory** : Production of rotating mmf by 3-phase currents fed to a symmetrical 3-phase winding.
Construction : Stator & rotor, Stator 3-phase windings.
Types of rotors : Squirrel cage rotor & phase wound rotor. principle of working, simplified theory with constant air gap flux; slip, frequency of rotor emf & rotor currents, mmf produced by rotor currents, its speed w.r.t. rotor & w.r.t. stator, production of torque & torque-slip relation, condition for maximum torque & expression for the maximum torque, torque-slip characteristics, effect of rotor resistance on torque-slip characteristics. Ratios of starting torque, full load torque and maximum torque.

Losses in three phase induction motor, power-flow chart, relation between rotor input power, rotor copper loss & gross mechanical power developed, efficiency & condition for maximum efficiency.

**Unit 06**  Induction motor as a generalized transformer; phasor diagram. Exact & approximate equivalent circuit; Circle diagram. Tests to determine the equivalent circuit parameters & for plotting the circle diagram. Computation of performance characteristics from the equivalent circuit & from circle diagram. Performance curves.


**Industrial Visit:-**
Minimum One visit to a machine manufacturing industry is recommended

**List of Experiments :**
Note : Any three experiments on transformer, two on D.C. machine and three on Induction motor.

1. O.C. S.C. test on single phase Transformer.
2. Polarity test on single phase and three phase transformer.
3. Sumpners test on two identical single phase transformers.
4. Parallel operation of two single phase transformers and study of their load sharing under various conditions of voltage ratios and leakage impedance.
5. Speed control of D.C. Shunt motor and study of starter
6. Brake test on D.C. Shunt motor
7. Load characteristics of D.C. series motor.
8. Swinburne’s test on D.C. shunt Motor.
9. Load test on 3-phase induction motor.
10. No load test & blocked-rotor test on 3-phase induction motor :
    (a) Determination of parameters of equivalent circuit
    (b) Plotting of circle diagram.
11. Calculation of motor performance from (a) & (b) above.
12. Speed-torque characteristics of 3-phase slip-ring induction motor with different values of resistances inserted in the rotor circuit.
Text Books:

1. Electrical Technology by Edward Hughes ELBS, Pearson Education.
2. Electrical Machines by Ashfaq Husain
4. Electrical Machines by Nagrath & Kothari, Tata Mc Graw Hill.
5. Electrical Machines by Bhag S Guru, Husein R. Hiziroglu, Oxford University Press.

Reference Books:

3. Theory and performance of DC machines by A.S. Langsdorf (Tata Mc Graw Hill)
5. Performance and Design of AC. Machines by M.G. Say (CBS Publishers and Distributors)
6. Electrical Machines by Smarajit Ghosh (Pearson Education), New Delhi.
Unit 01 Types of Networks: Lumped and distributed linear and nonlinear, bilateral and unilateral, time variant and time invariant, space variant and space invariant.

Independent and dependent (controlled) voltage and current sources.

Source transformation and shifting.

Network Equations: Network equations on loop basis and node basis, choice between loop analysis and node analysis. Concept of super node and super mesh, concept of voltage and current divider, mutual inductance, dot convention for coupled circuits, Concept of duality and dual networks.

Unit 02

Superposition, Thevenin, Norton, Reciprocity, Substitution, Compensation, Millmans theorems applied to electrical networks with all types of sources.

Unit 03

Solutions of differential equations and network equations using Laplace transform method and classical method for R-L, R-C and R-L-C circuits (series and parallel), Inverse Laplace transforms, transformed networks with initial conditions.

Analysis of electrical circuits with applications of step, pulse, impulse & ramp functions, shifted & singular functions the convolution integral.

Laplace transforms various periodic and non periodic waveforms application of Laplace transforms.

Unit 04

A) Two Port Network: Z, Y, H and transmission parameters, Inter-relations between parameters.

B) Input power, Power transfer and Insertion loss: Energy and power, Effective or Root-Mean -Square values, Average power and complex power, Problems in Optimizing power transfer, Insertion Loss

Unit 05

Fourier Analysis and Filters: The Fourier series, Evaluation of Fourier coefficients, symmetry considerations, exponential form of Fourier series, steady state response to periodic signals. Introduction to passive filters, low pass filters, high pass filters and by-pass filters and mentioned filter design.

Unit 06

Network Functions: Poles and Zeros: Terminal pairs or ports, network functions for the one port and two port, The calculation of network functions, ladder networks, general networks. Poles and zeros of network functions, Restrictions on poles and zeros locations for transfer functions, Time –domain behavior from the pole and zero plot. Stability of active networks
List of Practical:
Any four experiments from the first five of the following and any four experiments from rest of the list. (Minimum four experiments should be based on simulation software PSPICE/MATLAB along with hardware verification)

1. Verification of Superposition theorem in A.C. circuits.
2. Verification of Thevenin’s theorem in A.C. circuits.
3. Verification of Reciprocity theorem in A.C. circuits.
4. Verification of Millman’s theorem.
5. Determination of time response of R-C circuit to a step D.C. voltage input. (Charging and discharging of a capacitor through a resistor)
6. Determination of time response of R-L circuit to a step D.C. voltage input. (Rise and decay of current in an inductive circuit)
7. Determination of time response of R-L-C series circuit to a step D.C. voltage input.
8. Determination of parameter of two port network.
10. Determination of resonance, bandwidth and Q factor of R-L-C series circuit.
11. Determination of resonance of R-L-C Parallel circuit.

Text Book
5. Introduction to Electric Circuits -Alexander & Sadiku.
6. Introduction to Electric Circuits -S Charkarboorty.

Reference Books:
3. “Introduction to Circuit Analysis” by Bolylestad Robert L.
4. Electric Circuits and Networks by K.S. Suresh Kumar, Pearson Education
203147: Digital Computation Techniques

Teaching Scheme
Lectures: 4 Hrs / week

Examination Scheme
Paper: 100 Marks
Duration: 3 hrs

Unit 01 Introduction: Basic principle of numerical methods and necessity of computers for high speed calculations. Floating point algebra with normalized floating point technique, Significant digits.
Errors: Different types of errors, causes of occurrence and remedies to minimize them.
Numerical instability in computations.
Concept of roots of an equation and methods to find the same. Descartes’ rule of signs, Sturm’s theorem.
Solution of Polynomial Equations using - Synthetic division, Birge-Vieta and Lin-Bairstow methods.

Unit 02 Solution of Transcendental and Polynomial Equations: Bisection, Secant, Regula-Falsi, Chebyshev and Newton-Raphson methods, Newton-Raphson method for two variables and complex roots


Unit 04 Interpolation: Difference operators, Introduction to interpolation - Newton’s forward, backward, central (Stirling and Bessel) and divided difference formulae Lagrange’s interpolation.
Curve Fitting using Least square approximation – First order and second order.

Unit 05 Solution of ordinary differential equations: Euler’s, Modified Euler’s methods.
Taylor’s series method, Runge-Kutta second and fourth order methods. Milne-Simpson Predictor-Corrector method

Unit 06 Numerical Integration: Trapezoidal and Simpson’s rules as special cases of Newton-Cote’s quadrature technique.
Numerical Differentiation: Lagrangian and Newton-Gregory polynomials.

TEXT BOOKS:
REFERENCE BOOKS:
203148: Computer Programming

Teaching Scheme
Lectures: 2 Hrs / week
Practical: 2 Hrs / week

Revision: Basics of ‘C’ language - Data types, Operator precedence, ‘if-else’ and nested ‘if-else’ statements, ‘for, while and do-while’ statements etc.

Examination Scheme
Term work: 50 Marks
Practical: 50 Marks

Unit 01 Arrays: Introduction, one and two dimensional arrays. Features of C preprocessor, Macro expansion directives, File inclusion directives and compiler control directives.

Unit 02 Functions: Function declaration and prototypes. Local and Global variables, Types of functions – call by value, call by reference.

Unit 03 Pointers: Introduction, declaring and initializing pointers, pointer expressions, pointer and arrays, pointers and functions

LAB PRACTICE:
Term work shall consists of minimum eight computer programs in C or C++ language with flow charts and results based on syllabus of Digital Computational Techniques.

1. Minimum one program based on following methods of finding solution of Transcendental / polynomial equations –
   a. Bisection method
   b. Secant method
   c. Regula-Falsi method
   d. Newton–Raphson Method

2. Minimum one program based on following methods of finding solution of Polynomial equations –
   a. Birge Vieta method
   b. Lin Bairstow’s method

3. Minimum one program based on following methods of solution of system of linear simultaneous equations –
   a. Gauss Elimination method
   b. Gauss Seidal method / Jacobi method
   c. Matrix Inversion using Gauss Jordan
   d. Newton-Raphson method for two variables

4. Minimum one program based on following interpolation methods –
   a. Newton’s Forward Difference formula
   b. Newton’s Backward Difference formula
   c. Newton’s Divided Difference formula

5. Minimum one program based on following interpolation methods –
   a. Lagrange’s Interpolation method
   b. Bessel’s or Stirling’s method using central difference formula
   c. Curve Fitting using Least square approximation method.

6. Minimum one program based on following methods of Numerical Integration –
   a. Trapezoidal Rule
   b. Simpson’s $1/3$rd Rule
   c. Simpson’s $3/8$th Rule
7. Minimum one program based on following methods for solution of Ordinary Differential equation –
   a. Modified Euler method
   b. Runge-Kutta method (4th order)
8. Program based on Milne – Simpson’s method for solution of Ordinary Differential equation
203149: Microprocessor Fundamentals and Programming

Teaching Scheme
Lectures: 4 Hrs / week
Practical: 2 Hrs / week

Examination Scheme
Paper: 100 Marks
Duration: 3 hrs
Oral: 50 Marks

Unit 01  Architecture of 8085, Memory interfacing, Addressing modes, Instruction set 08 hrs

Unit 02  Assembly language programming, timing diagrams, stack operations, Interrupt structure, concept of lookup table. 08 hrs

Unit 03  Parallel Data transfer scheme (Synchronous, asynchronous, interrupt driven, polling type). Concepts in serial Communication, standards RS232, PCI 8251-Asynchronous mode. 06 hrs

Unit 04  Study, interfacing and programming of a) PPI 8255 mode 0,1, BSR mode b) PIT 8254- Mode 0,1,2 06 hrs

Unit 05  Study of ADC 0809, DAC 0808 Applications of 8085 08 hrs

Unit 06  Applications of 8085 :

List of Experiments:

Experiment 1 is compulsory, out of remaining any 7 experiments.

1. Assembly language Programming (8 experiments minimum)  
2. Interfacing of 8255 with 8085  
3. Interfacing of 8254 with 8085.  
4. Interfacing of 8 bit D/A and A/D converter with 8085.  
5. Control of stepper motor using 8085.  
9. Interfacing of seven segment LED display with 8085.
Text Books :

Reference book :
3. Liu and Gibson : Microprocessors and Digital systems : Tata McGraw Hill India