

Semester III

Diploma in Electrical Engineering

**DEE 301 : ELECTRICAL MACHINES**

3L+0T+0P+3C

MM100

**MODULE-I INTRODUCTION:** Introduction of Electrical Machines, Classification of Electrical machines, Basic principle.

**DC GENERATOR:** Introduction of DC machines, basic principle, construction, types of DC generator, EMF equation, LAP and WAVE winding, introduction of armature reaction and commutation, application

**MODULE-II DC MOTOR:** Working principle, back e.m.f., types of D.C. motor and elementary idea of their characteristics, torque equation, methods of speed control (Description only). Starting of D.C. Machines

**MODULE-III INDUCTION MOTORS:** Introduction of AC machines, Principle of operation and constructional of induction motors, types, starting and running torque, torque- slip characteristic, no load and block rotor test, losses and efficiency, application of induction motor,

**SINGLE PHASE INDUCTION MOTOR:** Introduction, types and construction of single phase induction motor, application of single phase induction motor.

**MODULE-IV SYNCHRONOUS MACHINES:** Introduction, construction, advantages of rotating field, types of rotor, emf equation, excitation system, comparison between induction machine and synchronous machines, working and application of synchronous generator (Alternator), principle of synchronous motor, working and application of synchronous motor.

**MODULE-V TRANSFORMERS:** Operating principle, E.M.F equation, ideal transformer, types, equivalent circuit, no load and short circuit test, efficiency, all day efficiency, back to back (Sumpner's test), phasor diagram, application

**POLYPHASE TRANSFORMER:** construction, various connection and groups, introduction of auto transformer, potential and current transformer.

**Project work:** A project work will be assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 - 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

**Text/ Reference Books:**

1. Asfaq Hussain "Basic Electrical Engineering", Dhanpat Rai
2. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill.
3. A.E. Fitzgerald, D.E., Higginbotham and A. Grabel, Basic Electrical Engineering, McGra Hill.
4. H. Cotton, Advanced Electrical Technology, Wheeler Publishing.

**DEE 302 : ELECTRICAL CIRCUIT THEORY**

2L+1T+0P+2.5C

MM100

**MODULE-I INTRODUCTION:** Active and Passive, Linear and Non-linear, Unilateral and Bilateral, Lumped and Distributed elements and networks, Ideal and practical, Voltage and current sources, Dependent and independent sources, sources conversion techniques,

**MODULE-II NETWORK THEOREMS:** Node and Mesh analysis, Star delta transformation. Superposition, Thevenin's, Norton's, Reciprocity, Tellegen's and Maximum power transfer theorems.

**MODULE-III A.C.THEORY:** Representation of sinusoidal quantities by phasor's, Physical explanation of the phase relationship between voltage and current when sinusoidal alternating voltage is applied across:- (a) Pure resistance, (b) Pure inductance and, (c) Pure capacitance. General Circuit Relations: Three Phase Star, Three Phase Delta, Star and Delta Combination, Basic introduction of the Low pass and High Pass filters

**MODULE-IV-POWER RELATIONS IN AC CIRCUITS:** Instantaneous Power in AC Circuits, Power Factor, Apparent Power, Reactive Power, Power Triangle, Complex Power.

**MODULE-V TWO PORT NETWORK:** Two port network, T-network,  $\pi$  network, Impedance parameter, Admittance parameter, ABCD (Transmission) parameter, hybrid parameter, inverse hybrid parameters, Series-parallel inter connections, Inter conversion, Image impedance, Image transfer constant

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**Text/ Reference Books**

1. Network Analysis, Van Valkenburg, Prentice Hall of India, New Delhi.
2. Network Filters and Transmission Lines, AK Chakravorty, Dhanpat Rai & Co. Publication, New Delhi.
3. Network Lines and Fields, John D Ryder, Prentice Hall of India, New Delhi.
4. Network Analysis, Soni and Gupta, Dhanpat Rai & Co. Publication, New Delhi.

**DEC 302 : ELECTRONICS DEVICES & CIRCUITS**

3L+0T+0P+3C

MM100

**MODULE-I P-N JUNCTION:** Basic introduction of P-N junction Diode, Half wave Rectifier, Full wave rectifier, bridge type rectifier, ripple factor, efficiency of a rectifier etc. L, C, LC- and Pi-filters, ripple factor in each

**MODULE-II TRANSISTOR CIRCUITS:** Concept of transistors, V-I characteristics of transistor in CB, CC, and CE configuration design of voltage amplifiers: Regions of operation, Load line analysis of transistor amplifier, hybrid parameter model, Design procedure of Direct coupled R-C coupled and transformer coupled amplifier .

**MODULE-III REGULATED POWER SUPPLY:** Need of voltage regulation, Regulated Power Supplies: Simple zener voltage regulator, transistorized series and shunt regulators; Design of regulated power supplies using voltage regulator IC`s like: 78XX and, 79XX series, Introduction of 'SMPS' and UPS.

**MODULE-IV FEEDBACK AND OSCILLATORS:** Basic concept of feedback, merits and demerits of negative feedback, series and shunt feedback circuits, Design of RC and LC oscillators. Multi-vibrators, Power amplifiers: class A, and class B amplifier.

**MODULE-V SPECIAL DEVICES:** Construction Operation equivalent circuits and characteristics of JFET, MOSFET, CMOS, and Semiconductors photo devices: LED, LDR, Photo transistor and LCD Varactor Diode

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**Text/ Reference Books:**

1. Electronic Devices and Circuits, Millman J. et al Tata McGraw Hill, 2007.
2. Electronic Devices and Circuits, Boylestad R.L. And Louis Nashelsky, Prentice Hall, 2006.
3. Electronic Devices and Circuits, Bogart T.F. Jr., J.S.Beasley and G.Rico, Pearson Education , 2004.
4. Principles of Electronic Circuits, Burns S.G. and P.R.Bond, Galgotia Publications, 1998.
5. Microelectronics, Millman and Grabel, Tata McGraw Hill, 1988.
6. Electronic Devices and Circuits, Dr. K. Lal Kishore, B.S. Publications, 2005.
7. Electronic Devices and Circuits, Prof GS N Raju, I K International Publishing House Pvt. Ltd.

**DEC 301 : DIGITAL ELECTRONICS**

**2L+1T+0P+2.5C**

**MM100**

**MODULE-I LOGIC FAMILIES:** DTL-, TTL-, ECL-, MOS- families and their characteristics; circuit details, analysis, and loading rules. **Number System:** Decimal, Binary, Octal, and Hexadecimal systems, Binary Arithmetic, BCD and Gray code. Boolean algebra and Demorgan's Theorems.

**MODULE-II LOGIC GATES:** BUFFER, NOT, AND, OR, NAND, NOR, X-OR, and X-NOR gates, Combinational Logic Circuits: SOP and POS forms, reduction and inter conversion of forms, logic design using K maps.

**MODULE-III ADDER & SUBTRACT OR CIRCUITS:** Half adder, full adder, half subtract or, full subtract or, design of all these circuits using discrete gates. Flip-Flops: RS flip-flop, J-K, D-, T-flip-flops; Racing problem and the Master-Slave, J-K Flip-flop.

**MODULE-IV SEQUENTIAL LOGIC CIRCUITS:** Design of asynchronous and synchronous up/down counters, Shift Registers: SIPO, SISO, PIPO, and PISO register Multiplexers and de-multiplexers; of 4:1, Basic idea of decoders and encoders.

**MODULE-V ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS:** Basic terms and definitions, Conversion methods: ADC and DAC, type of convertors: integrated type, Ramp type, Successive approximation methods.

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**Text / Reference Books:**

1. Digital Principles and Applications, Malvino & Leach, Tata McGraw Hill
2. Digital Electronics, Signov & Donovan, Delmar Thomson Learning.
3. Op-Amps and Linear Integrated Circuits, Gayakwad R.A., Prentice Hall of India,
4. Digital Electronics, Taub & Schilling, Tata McGraw Hill
5. Electronics Analog and Digital, Nagrath, Prentice Hall of India Ltd.
6. Modern Digital Electronics, Jain R.P., Tata McGraw Hill.
7. Digital Systems, Ronald J.Tocci & Neal S. Widmer, Pearson Education.

Semester III

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## ENG 108 : TECHNICAL COMMUNICATION

2L+0T+0P+2C

MM100

**MODULE-I FUNCTIONAL GRAMMAR:** Active, Passive voice, Conditional Sentences, Syntax, Concord, and Common Errors.

Practical (Oral): To make students practice the above mentioned grammatical rules in the practical classes.

**MODULE-II COMMUNICATION:** Meaning & Importance of communication, Process of communication, Language as a tool of communication.

Practical (Oral): To make students speak on their understanding of communication

**MODULE-III WRITING SKILLS:** Reporting events, writing newspaper reports, Bio-data making, writing of Resumes, and writing job application.

Practical (Oral): To make students practice writing on the above mentioned processes.

**MODULE-IV LISTENING SKILLS:** The listening process, hearing & listening, types of listening, Barriers to listening.

Practical (Oral): To make student develop the skills of listening & thus improve their speaking skills.

**MODULE V PROJECT WRITING:** Project writing for sponsoring agencies. Research paper and data sheet preparation and communication for publication. Preparing analysis report

**Text/ Reference Books:**

1. Technical Communication Principles & Practices, Raman Meenakshi & Sharma Sangeeta, ONP, New Delhi
2. Wren & Martin: High School English Grammar & Composition- S.Chand & Co. N.Delhi

Semester III

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**DEE 303 : ELECTRICAL MACHINES LAB**

0L+0T+4P+2C

MM100

**LIST OF EXPERIMENTS**

1. To verify that in an A.C. circuit, the phasor sum (not the algebraic sum) of currents at any junction is zero.
2. To find the voltage-current relationship in a R-L series circuit and to measure power and power factor of the circuit.
3. To find for a filament lamp:-
  - (a) Variation of resistance with temperature.
  - (b) Variation of temperature with voltage.
  - (c) Variation of resistance with voltage.
  - (d) Variation of power with voltage.
4. To measure power and power factor in three phase system by two wattmeter method.
5. To determine the efficiency and regulation of a transformer by performing direct loading.
6. To measure the induced emf of separately excited D.C. generator as a function of field current.
7. To measure the terminal voltage of a separately excited D.C. generator as a function of load current.
8. To measure the terminal voltage of a D.C. shunt generator as a function of load current.
9. To measure the speed of a separately excited D.C. motor as a function of load torque at rated armature voltage.
10. To observe the difference in the starting current at switching on single phase capacitor start induction motor with:-
  - (a) The capacitor disconnected and
  - (b) The capacitor connected.Also to determine how to reverse the direction of rotation.
11. To start a Three Phase induction motor and to determine its slip at various loads.
12. To determine V-curves of a synchronous motor.

Semester III

Diploma in Electrical Engineering

**DEE 304 : ELECTRICAL CIRCUIT LAB**

0L+0T+4P+2C

MM100

**LIST OF EXPERIMENTS**

1. Verification of principle of superposition theorems with dc sources.
2. Verification of Norton theorems in DC circuits
3. Verification of Maximum power transfer theorems for DC network
4. Determination of transient response of current in RL Circuits.
5. Determination of transient response of current in RC Circuits.
6. Determination of transient response of current in RLC circuit.
7. Determination of z and h parameters (dc only) for a two port network.
8. To measure the characteristic impedance of symmetrical T and  $\pi$  networks
9. To measure the image impedance of a given asymmetrical T and  $\pi$  networks
10. For a prototype low pass filter:
  - a) Determine the characteristic impedance experimentally
  - b) Plot the attenuation characteristic

**DEC 304 : ELECTRONICS DEVICES & CIRCUIT LAB**

**0L+0T+4P+2C**

**MM100**

**LIST OF EXPERIMENT**

1. Design of unregulated power supply using half wave rectifier
2. Design of unregulated power supply using Full wave rectifier
3. Design of regulated power supply using Shunt regulator
4. Design of regulated power supply using series regulator
5. Study and design a D.C amplifier
6. Study and design an A.C amplifier
7. Study and design a two stage amplifier
8. To generate square-wave using a multi-vibrator and to observe the wave form on a CRO.
9. To observe Triggering and working of a bi-stable circuit and observe its output wave form on a CRO.
10. To observe Triggering and working of a multi-vibrator circuit and observe its output wave form on a CRO.

Semester III

Diploma in Electrical Engineering

**DEC 303 : DIGITAL ELECTRONICS LAB**

**0L+0T+4P+2C**

**MM100**

**LIST OF PRACTICALS**

1. Verify truth tables of various basic logic functions.
2. Verify truth tables of various universal logic functions.
3. Design and verify the truth table of half adder
4. Design and verify the truth table of full adder
5. Design and verify the truth table of half subtractor
6. Design and verify the truth table of full subtractor
7. Design 4:1 Multiplexer
8. Design 1:4 De-multiplexers
9. Design 4:1 Encoder
10. Design 1:4 Decoders.
11. To study various types of flip-flop
12. To study various types of counters

Semester III

Diploma in Electrical Engineering

**ENG 112 : ADVANCE SOFT SKILL**

**0L+0T+2P+1C**

**MM100**

**MODULE: 1-** What is Personality? Personality Traits & Grooming

**MODULE: 2 -** Importance of Attire, Table Manners

**MODULE: 3 -** General Etiquettes-

(a) Talking to Elders/ Younger ones/ Peer/ Stranger

(b) Treating Gender Discrimination

**MODULE: 4 -** Behaviourology- With Parents/ Relations/ Neighbors

**MODULE: 5 -** Use of Language –

(a) Spoken- At phone/ General Conversation

(b) Written- E- mails/ other electronic media

**Text/Reference Books:**

1. Business communication Design, Angell, Pamela, Mcgraw-Hill, New York.
2. Grammar Finder, Eastwood, John, Oxford university press.
3. Effective technical communication, Mitra, K. Barun, Oxford university press.
4. Communicate to conquer: A handbook of group discussion and interviews, PHI learning, New Delhi.

Semester IV

Diploma in Electrical Engineering

**DEE 401 : ELECTRICAL WORKSHOP**

3L+0T+0P+3C

MM100

**MODULE I: WIRING:** System and type of wiring, Wiring diagram of Fluorescent tube, Mercury vapour lamp, Sodium vapour lamp, Neon sign lamp, Electronic flasher.

**MODULE II FAULT INVESTIGATION AND TESTING:** Electric heater, Room heater, Electric kettle, Electric soldering Iron, Ceiling & wall fan, Washing machine, Refrigerator, Air conditioner and Water cooler.

**MODULE III ELECTRICAL MAINTENANCE AND REPAIR:** Need & type of maintenance, General structure and equipments of electrical repair shop, Repair record and maintenance schedule. Maintenance and repair of- Storage batteries, Transformer, D.C. motor & A.C. motor.

**MODULE IV SAFETY MEASURES:** Study of various safety devices and appliances, Safety measure for working on low, medium and high voltage, Mains and study of apparatus used, Use of fire fighting equipment's (fire extinguishers ), Electric shock treatment, first aid safety.

**MODULE V AUTOMOBILE ELECTRICAL SYSTEM:** Dynamo, self-starter, Ignition coil, Voltage regulator, lighting circuits of two-wheeler and four-wheeler.

**Text/ Reference Books:**

1. Microelectronics, Millman and Grabel, Tata McGraw Hill, 1988.
2. Electronic Devices and Circuits, Dr. K. Lal Kishore, B.S. Publications, 2005.
3. Electronic Devices and Circuits, Prof GS N Raju, I K International Publishing house pvt. ltd.

Semester IV

Diploma in Electrical Engineering

**DEE 402 : ELECTRICAL & ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

2L+1T+0P+2.5C

MM100

**MODULE-1 CLASSIFICATION OF MEASURING INSTRUMENTS:** Indicating, recording and integrating instruments, Accuracy and sensitivity, Types of errors, Deflecting, controlling and damping torque, Construction, working principle and operation of PMMC, ammeter and voltmeter.

**MODULE-2 WATT-METERS AND ENERGY METERS:** Construction, operation and working principles, Dynamometer type wattmeter, Induction type wattmeter, Blondels theorem and measurement of power by two wattmeter method in 3-phase circuits, Single phase and three phase induction type energy meter, Testing of single phase induction type energy meter by direct and phantom loading.

**MODULE-3 MEASUREMENT OF RESISTANCE:** Classification of resistance, Measurement of low resistance by Kelvin's double bridge, Measurement of medium resistance by Ammeter and Voltmeter, Whetstone's bridge, Measurement of high resistance and insulation resistance, Megger Earth tester and Ohmmeter

**MODULE-4 POTENTIOMETERS AND DISPLAY:** Types of A.C. and D.C. potentiometers-Construction, Standardisation, Applications, CRO, Function Generator, DSO

**MODULE-5 A.C. BRIDGES:** General equation for bridge balance, Maxwell's inductance bridge, Maxwell's inductance capacitance bridge, Anderson's bridge, Schering Bridge, Wein's bridge for frequency measurements

**Text/ Reference Books:**

1. Electrical Measurement & Instrumentation A.K.Sawhney, Dhanpat Rai Publications
2. Electrical Measurement & Instruments, J.B.Gupta, Katson & Sons Publications
3. Measurement and Instrumentation Principle, Alan Morris, Butter Worth Publications
4. Electrical Measurement D.R.Nagpal, Standard Publishers Distributors

Semester IV

Diploma in Electrical Engineering

**DEE 403 : GENERATION OF ELECTRICAL POWER**

3L+0T+0P+3C

MM100

**MODULE I THERMAL POWER STATION:** Site selection, Layout diagram showing various components including electrical equipment used, working of station – thermodynamic cycles. Utilities of various components as shown in layout diagram, Methods of firing boilers fluidized bed combustion choice of pressure of steam generation and steam temperature, elementary idea of turbines, draught mechanism, problems and methods of dust collection, steam power plant efficiency – Problems

**MODULE II HYDRO-ELECTRIC POWER STATIONS:** Site Selection. Classification of hydroelectric power stations: (i) On the basis of availability of water run-off river type with/without pondage – pumped storage plants. (ii) On the basis of head available – low medium and high head. Classification of turbines based on the principle of operation and head of water. Capacity calculations for hydropower plant, layout of hydroelectric power plants with different heads and layout of proposed storage plant.

**MODULE III NUCLEAR POWER PLANT:** nuclear reactor, fuels, moderators, coolants, control rods – general layout of nuclear power plant, classification of nuclear power plant – precautionary measures adopted in nuclear power plants, idea about some important plants in India. - vantages and disadvantages of thermal, hydro & nuclear power stations in respect of site, initial & running cost, sources, simplicity, cleanliness, efficiency & maintenance. Captive power plants, Diesel Power Plant & Gas-turbine Plants: General layout of plants, merits & demerits, methods of improving output and performance.

**MODULE IV LOADS AND LOAD CURVES:** Types of load, chronological load curve, load duration curve. Maximum demand, demand factor, load factor, diversity factor, capacity factor and utilization. **(ii) Power factor improvement:** Causes and effects of low power factor and advantages of power factor improvement. Power factor improvement methods: using shunt capacitors and synchronous condensers.

**MODULE V POWER PLANT ECONOMICS:** (i) Capital cost of plants, annual fixed and operating costs of plants, generation cost. (II) COGENERATION: methods of cogeneration, advantages and disadvantages.

**Text/Reference Books:**

1. Energy for Sustainable World, Jose Goldenberg, and Reddy, A.K.N., WileyEastern, 2005.
2. World Energy Resources, Charles E. Brown, Springer Publication, New York, 2002.
3. Principles of Energy Conversion, Culp, A.W., McGraw Hill New York, 2004.
4. Energy Policy and Planning, Bukhootsow, B., Prentice Hall of India, New Delhi, 2003.
5. International Energy Outlook, EIA Annual Publication, 2011.
6. Generation of Electrical Energy, B.R. Gupta, Wheelar Publications
7. Generation of Electrical Power, Soni, Gupta and Bhatnagar, Dhanpat Rai Publications
8. Electrical Power, S. L. Uppal, Khanna Publications

Semester IV

Diploma in Electrical Engineering

**DEE 404 : INDUSTRIAL ELECTRONICS**

2L+0T+0P+2C

MM100

**MODULE I THYRISTORS AND THEIR APPLICATIONS:** Name, symbol and typical applications of members of thyristors family. SCR, Triac & Diac-Basic structure, operation, V-I characteristics and ratings, gate circuits, triggering process and triggering circuits, turn off methods and circuits, selections of heat sinks, mounting of thyristor on heat sinks, basic idea of protection of thyristor circuits. UJT-Operation, V-I characteristics, equivalent circuit

**MODULE II APPLICATION OF SCR:** SCR, Diac and Triac switching circuits like automatic battery charger, voltage regulator, emergency light, alarm circuits, time delay relay circuits and circuits for over current and over voltage protection. A.C. phase control using SCRs and Triacs, variable speed drives using DC motors and small AC machines.

**MODULE III RECTIFIERS: OPERATION** of three Phase Bridge controlled rectifier and its applications. Principles of operation of basic inverter circuits, basic series and parallel commutated inverters, principle of operation of cyclo-converter, choppers and dual converter, mention of applications.

**MODULE IV INDUCTION AND DIELECTRIC HEATING:** Introduction, importance of heating in industry, Principle of induction heating, Industrial applications of induction heating, Principle of dielectric heating, Industrial applications of dielectric heating.

**MODULE V TRANSDUCER:** Classification of transducer Primary transducer Secondary transducers Active transducer Passive transducer Analog transducer Digital transducer Construction, principle of operation and application of the following transducers : Potentiometer LVDT and RVDT. Resistance strain gauge factor, gauge materials, temperature compensation, thermocouple, Thermister, RTD, Photo cell, Piezo Electric, Capacitive PH electrode.

**Project work**

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**Text/ Reference Books**

- 1.Power Electronics Circuits, Devices & Application, M. H. Rashid, P.H.I
- 2.Power Electronics: Principle and Application, J. Michael Jacob, Viks Publishing House Pvt. Ltd.
- 3.Optoelectronics an Introduction to Materials and Devices, Singh Jasprit, McGraw-Hill
- 4.Instrumentation Devices & Systems, C. S. Ranjan, Tata McGraw Hill.

**Semester IV**

**Diploma in Electrical Engineering**

**DCS 402 : COMPUTER PROGRAMMING USING C**

**2L+1T+0P+2.5C**

**MM: 100**

**Module I:** Elements of C: character set, key words, Data types, Constants and Variables, Operators: unary, binary, ternary, Operator precedence, flowcharts. Control statement- if statement, if-else statement, conditional operator, switch control statement, for loop, while loop, do-while loop, the break and continue keyword.

**Module II:** Array Introduction: Basic concepts, Memory representation, one dimensional array, Two dimensional arrays and Three dimensional arrays.

**Module III:** Functions- Basic Concepts, Declaration and prototypes, Calling, Arguments, and Scope rules, recursion, Storage classes types, Library of functions: math, string, system.

**Module IV:** Pointers- Basic concepts, operators, Pointer expression: assignment, arithmetic, comparison, Dynamic memory allocation, Pointer v/s Arrays, Array of pointers, Pointer v/s Functions.

**Module V:** Structure- Basic concepts, Declaration and memory map, Elements of structures, Structure v/s array, Structure v/s function, Union, Enumerated data types: typedef, enum, Self-referential structures, Low level Bitwise Operators.

**Text/Reference Books:**

1. Let us C, Yashwant Kanetkar, BPB
2. Programming with C, Schaum's Series, TMH
3. C Programming E. Balaguru Swami, TMH

**Semester IV**

**Diploma in Electrical Engineering**

**DEE 405 : ELECTRICAL WORKSHOP LAB**

**0L+0T+4P+2C**

**MM100**

**LIST OF EXPERIMENT**

1. Wiring diagram of – Sodium Vapour Lamp, Mercury Vapour Lamp
2. Fault investigation and testing of – Electric heater, Room heater, Electric kettle and Soldering iron
3. Dismantling, Identifying various parts, fault finding and removing, reassembling-
4. Fan, Electric washing machine, Refrigerator, Air conditioner and Water cooler.
5. Maintenance and repair of – Transformer, D.C. motor, A.C. motor and storage batteries.
6. Prepare a safety poster.

**Semester IV**

**Diploma in Electrical Engineering**

**DEE 406 : ELECTRICAL & ELECTRONICS MEASUREMENT AND  
INTRUMENTATION LAB**

**0L+0T+4P+2C**

**MM100**

**LIST OF EXPERIMENT**

1. Study of constructional features and calibration of moving iron and moving coil type ammeter and voltmeter.
2. Study of constructional features and calibration of dynamometer type wattmeter and induction type energy meter.
3. Measurement of power in 3-phase circuits by two wattmeter method
4. Testing of single-phase induction type energy meter by direct Method
5. Measurement of resistance by Kelvin's double bridge
6. Measurement of resistance by Whetstone bridge
7. Study of the constructional details and working of Megger and measurement of insulation resistance.
8. Measurement of Earth's resistance by Earth tester
9. Calibration of ammeter and voltmeter by D.C. potentiometer
10. Measurement of inductance and capacitance with the help of a suitable A.C. Bridge

**Semester IV**

**Diploma in Electrical Engineering**

**DEE 407 : INDUSTRIAL ELECTRONICS LAB**

**0L+0T+4P+2C**

**MM100**

**LIST OF EXPERIMENT**

1. Identification of various types of packages and terminals of various low and high Power thyristors (SCR and Triac)
2. To determine and plot firing characteristics of SCR:-
  - (a) By varying the anode to cathode voltage.
  - (b) By varying the gate current.
3. Observing voltage wave shapes at various points of UJT relaxation oscillator circuit.
4. Observation of wave shapes at relevant points of the circuit of a single phase controlled rectifier using SCR and UJT relaxation oscillator.
5. To determine the firing characteristics of Triac in different mode i.e.  
Mode-I (plus), Mode-I (minus)  
Mode-III (plus), Mode-III (minus)
6. Observe the wave shapes and measure AC and DC voltage at various points of a three phase bridge rectifier circuit.
7. Observe the wave shapes and measure AC and DC voltage at various points of a three phase SCR controlled bridge rectifier circuit.
8. Test an AC phase control circuit using Triac and observe wave shapes and voltages at relevant points in circuit (while using for lamp intensity control and/or AC fan speed control).
9. To study the working of a single phase SCR/ transistor inverter circuit by observing wave shapes at input and output.
10. To measure force and pressure by using strain gauge transducer.

**Semester IV**

**Diploma in Electrical Engineering**

**DCS 406 COMPUTER PROGRAMMING USING C LAB**

**0L+0T+4P+2C**

**MM100**

**Write Programming Codes in C on Following Topics**

1. WAP in C to calculate Factorial of a number by using function
2. WAP in C to swap two numbers by using function
3. WAP in C to read and display array elements
4. WAP in C to read an array and display the sum of its elements
5. WAP in C to add two 3x3 matrix
6. WAP in C to multiply 3x3 matrix
7. WAP in C to calculate the length of the given string.
8. WAP in C to read information about 10 books and display them
9. WAP in C to read a file and display its contents

**Semester IV**

**Diploma in Electrical Engineering**

**MGT 110 : GENERAL APTITUDE**

**0L+0T+2P+1C**

**MM100**

**MODULE-1** Number System, Number Series, HCF and LCM of Numbers, Fractions and Decimals, Square Root and Cube Roots, Indices and Surds, Simplification and Approximation,

**MODULE-2-** Problems on Ages and Numbers Percentage, Profit, Loss and Discount, Average, Ratio and Proportion, Time, Work and Wages, Pipes and Cisterns, Simple Interest, Compound Interest,

**MODULE-3-** Growth and Depreciation, Time and Distance, Trains, Boats and Streams, Races, Clocks, Calendar

**MODULE-4-** Area of Plane Figures, Volume and Surface Area of Solid Figures Elementary Algebra, Linear Equations, Quadratic Equations and In-equation, Progression,

**MODULE-5-** Permutation and Combination, Probability, Geometry, Trigonometry, Data Interpretation, Data Sufficiency

**Text/Reference Books:**

1. R. S. Agarwal-Apttitude MATHmatics
2. Mathuria –Quicker Mathmatics

Semester V

Diploma in Electrical Engineering

**DEE 501 : SWITCHGEAR AND PROTECTION**

2L+1T+0P+2.5C

MM100

**MODULE-I ELEMENTS OF PROTECTION AND PROTECTIVE RELAYS:**

Line diagram and elements of power system, faults in power system: their causes, types and effects. Function of basic elements of a protective system. Backup protection & its types, Concept of protective relay and its selection, classification of relays. Principle of working and operation of relays and their construction. Basic terms related to relay like pick up value, reset value- and operating current etc. Use the static relays in modern power system. Settings of different types of relays. Maintenance and testing of relay. Principle and working of Microprocessor based relay.

**MODULE II PROTECTIVE TRANSFORMERS, NEUTRAL EARTHING:**

Necessity of Protective Transformers. Polarity marking of C.T. & P.T. and their specifications. Connection diagram of C.T. & P.T. in a 1- phase and 3-phase Protective systems. Importance of Neutral Earthing. Methods of Neutral Earthing & its advantages. Applications.

**MODULE III CIRCUIT INTERRUPTING DEVICES:**

Necessity & types of interruption devices like ACB, OCB, ABCB, SF6 and vacuum circuit breakers. Line diagram of a protective system showing different circuit interrupting devices. Sequence of operation and interlocking. Requirement & types of isolators. Fuse, types and their characteristics. Testing & application of fuses. Arc formation process. A.C circuit, Zero current interruption. Working principle and various types of circuit breakers.

**MODULE IV PROTECTIVE SYSTEMS:**

Abnormalities & faults in a power system & its effects. Protection schemes for alternator. Protection against Prime mover failure and unbalance loading. Protection of transformers. Protection of Transmission line and feeders. Protection of motors, Protection of bus bars.

**MODULE V OVER VOLTAGE PROTECTION:**

Causes of over-voltages. Methods of reducing over-voltages, Operating principles, construction & applications of lightning arrestor. Insulation co-ordination & volt- time characteristic.

**Text/Reference Books**

1. Switch gear & Protection- S. Rao, Khanna Publishers
2. Protective Relaying Vol. I & II-Van Warrington,
3. Protective Relaying, Russel & Mason, GE Publications
4. Electrical Power, S.L.Uppal, Khanna Publishers
5. Switch gear & protection, Chandev & Rambhadaran

Semester V

Diploma in Electrical Engineering

**DEE 502 : ELECTRICAL INSTALLATION AND MAINTENANCE**

3L+0T+0P+3C

MM100

**MODULE-I INSTALLATION, MAINTENANCE OF ELECTRICAL MACHINE/EQUIPMENT:**

Standard procedure for installation of various electrical machines such as Transformer (I.S 1886: 1967), Rotating electrical m/c (I.S.900-1965) as well as electrical wiring (I.S.2274: 1963) and switchgear (I.S.3072:1975), Inspection on arrival and before installation. Storage preparation for installation, foundation preparation. Tools/Instruments required for installation. Safety precautions to be observed. Installation procedure for electrical machine/ equipment. Preparation of technical report & specification sheet. Basic need of maintenance. Meaning of preventive maintenance. Importance and advantages of preventive maintenance. Maintenance schedules of different types of electrical machines(rotating and static) and equipment. Maintenance of transmission lines, circuit-breaker and cables. Break down maintenance and its record keeping. Safety rules applicable for preventive maintenance and breakdown maintenance.

**MODULE-II INSTALLATION & MAINTENANCE OF DOMESTIC APPLIANCES:** Common faults in domestic appliances. Installation procedure for domestic appliances, Maintenance procedure for domestic appliances. Tools/equipment required for maintenance of domestic appliances. Safety rules observed while maintenance of domestic appliances.

**MODULE-III EARTHING:** Necessity of earthing, system of earthing, Equipment for earthing, Methods of earthing, Earth electrodes, Earth bus & Earth wire. Measurement of earth resistance. Values of earth resistance of different equipment/installation. Reduction of earth resistance. Earthing procedure, Installations in building - Domestic fitting & appliances- Industrial premises. - Substation & Generating station. Overhead power lines.

**MODULE-IV CABLES AND CABLING:** Cable laying methods, Cable jointing and termination, Definition of trouble shooting. Causes of faults and types of faults. Common faults in domestic appliances and other machine equipment. Common faults in electrical installation and cable. Trouble shooting charts for above electrical equipment and machines. Tools and equipment used in trouble shooting. Remedial measures to be taken for faults in electrical machines and equipment.

**MODULE-V ELECTRICAL ACCIDENTS AND SAFETY:** Types and causes of electrical accidents. Factors affecting severity of electric shock. Preventive measures against electrical accident. General and specific safety rules to avoid electrical accident as per I.E. acts. Importance of "permit to work" in power station. Safety tools and devices with their applications like slogan, Board, Notice, Fire extinguisher etc.

**Text/Reference Books:**

1. Electrical installation, Maintenance and fault location work book TTTI-Bhopal, Somaiya publication
2. Electrical Installation, Estimating and costing- S.L. Uppal, Khanna Publisher
3. Operation and maintenance of electrical equipment-B. V. Rao, Asia Publication
4. Electrical maintenance and repairs-J.I. Watts- Mc millar, London,
5. Troubles in electrical equipment-N.E. Stafford- Mc Graw. Hill

**DEE 503 : TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER**

2L+1T+0P+2.5C

MM100

**MODULE-I SUPPLY SYSTEMS:** Basic network of power system. Transmission & distribution voltage, effect of system voltage on size of conductor and losses. Comparison of DC 2- wire, DC 3-wire, 1- phase AC and 3- phase AC (3- wire and 4- wire) systems.

**MODULE-II DISTRIBUTION SYSTEMS:** Primary and secondary distribution systems, feeder, distributor and service mains. Radial and ring-main distribution systems. Kelvin's law for conductor size.

**MODULE-III PARAMETERS OF TRANSMISSION LINES:** Effect of voltage on transmission efficiency, line regulation and volume of conductor materials and selection of economical transmission voltage. Sag calculations. Performance of short and medium transmission lines (T and  $\pi$  network). Layout of control room and its equipment at power station. Layout and equipment of switchyard at power station.

**MODULE-IV H.V.D.C. TRANSMISSION:** Operational aspects of H.V.D.C. transmission, DC Links, comparison with A.C system, Schematic arrangement with converting and inverting equipment.

**MODULE-V CONTROL OF POWER STATION:** Voltage control method. Speed governor system. Importance of PLCC in power transmission system. Function of load dispatch system, Load sharing. SCADA – introduction and components of SCADA

**Text/Reference Books:**

1. Electric Power Distribution, A S Pabla, (TMH)
2. Power System Analysis & Design, B R Gupta, S. CHAND PUBLISHERS
3. A Course in Electrical Power, Soni, Gupta and Bhatnagar, Dhanpat Rai
4. Electrical Power Systems, C.L. Wadhwa, New Age Publications
5. Modern Power System Analysis, Nagrath Kothari, (TMH)
6. Power System Analysis, J. J. Grainger & W. D. Stevenson, (TMH).
7. Electrical Power Distribution Systems, Kamaraju, (TMH)

**DEE 504 : CONTROL SYSTEM**

**3L+0T+0P+3C**

**MM100**

**MODULE-I INTRODUCTION:** Need of automatic control, Concept of open loop and closed loop control, Block diagram of feedback control system and its basic elements, relative advantages and disadvantages of open loop and closed loop control system, definition and explanation of given control system: Linear and Non-Linear Systems, Continuous and discrete Systems, Static and Dynamic Systems, Single Input Single Output (SISO) System and Multi-input Multi-output (MIMO) System.

**MODULE-II COMPONENTS & DEVICES USED IN CONTROL SYSTEM:** Brief description and working of potentiometer, self balancing potentiometer, differential transformer, synchros, servomotors, tacho generators, saturated core reactor and magnetic amplifier.

**MODULE-III INPUT OUTPUT RELATIONSHIP OF SYSTEM & CONTROL SYSTEM COMPONENTS:** Concept of transfer function and its use in control system, Derivation of transfer function of given systems: Simple RC low pass network, Lag, Lead, Lag-Lead compensating networks, DC servomotor and DC Tacho generator, derivation of transfer function by block reduction technique and signal flow graph.

**MODULE-IV PERFORMANCE OF CONTROL SYSTEM:** Step, Ramp, Pulse and sinusoidal type of inputs and their Laplace Transforms, Definitions of Rise time, Peak overshoot, Settling time, Natural frequency and Damping Ratio pertaining to second order system, Initial value and final value theorems and their use in control systems, Types of feedback systems and error constants.

**MODULE-V STABILITY CRITERION:** Bounded Input and Bounded Output (BIBO) System, Concept of Stability, stability criteria, different techniques of determining stability e.g. Routh, Nyquist criteria, bode plot and their applications to simple system. Electric Controller: On-OFF controller, Proportional, Proportional plus integral (PI), Proportional plus integral plus derivative (PID).

**Project work**

A project work will be assigned to students by the subject faculty. It will be of 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty and students will work in a group of 3 - 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

**Text/Reference Books:**

1. Norman S. Mise "Control System Engineering", Wiley Publishing Co.
2. M.Gopal, "Control System; Principle and design", Tata McGraw Hill.
3. M.Gopal, "Modern Control system", Tata McGraw Hill.
4. D.Roy Choudhary, "Modern Control Engineering", Prentice Hall of India.
5. I.J. Nagrath and M. Gopal -Control Systems Engineering, 3rd Ed., New Age Publication
6. K. Atsuhiko Ogata: Modern Control Engineering, PHI

Semester V

Diploma in Electrical Engineering

**MGT 102 : ENTREPRENEURSHIP DEVELOPMENT**

2L+0T+0P+2C

MM100

**MODULE-I ENTREPRENEURSHIP:** Entrepreneurship: Entrepreneur, Enterprise and Environment, Origin and Historical development of entrepreneurship, Who is an entrepreneur? Various definitions of Entrepreneur. Ventures in India, Current economic and industrial environment.

**MODULE-II ENTERPRISE AND ENVIRONMENT:** Environmental function, Critical factors for launching of a new enterprise, Identifying and evaluating opportunities, Developing a business plan, Mobilization of essential resources, Competitor and Industrial Analysis

**MODULE-III SMALL, MEDIUM AND LARGE INDUSTRIAL SECTORS:** Industrial Potential, Demand And Resource Based Industries, Service Sector, corporate entrepreneurship, entrepreneurship and technocrat entrepreneurship.

SSI: Definition and legal frame planning for small enterprise; major policies. Organization of SSI units, Role of SIDO, NSIC and SSI corporate.

**MODULE-IV DEVELOPING BUSINESS MODEL:** Concept to Creation, Teething Problems of startup, Organizing and Marketing a Startup Selling on the web, launching e-commerce, Starting and growing an Enterprise, Growth Path.

**MODULE V: CREATIVITY:** – A necessity for survival , Creative problem solving techniques , Innovation Management , Organizational Setups that facilitate Innovations , Management of Research and Development , Strategic Alliances and Networks , Incubators And Accelerators.

**Text/Reference Books:**

1. Organization & Management of Small Scale Industries: Desai J. V. Himalaya, Bombay 1985.
2. Management of Small Scale Industry: 3<sup>rd</sup> Himalaya. Bombay 1986.
3. The Story of an Entrepreneur: M. Nath, IMT Monographs.
4. Small Industry Entrepreneurs Handbook: Mohan, K.K. Bombay Productivity Services International.
5. Handbook of Entrepreneurship: Rao & Pareek. New Delhi: learning System 1978.

Semester V

Diploma in Electrical Engineering

**DEE 505 : SWITCHGEAR AND PROTECTION LAB**

0L+0T+2P+1C

MM100

**LABORATORY EXPERIMENTS:**

- (1) Use overload relay and obtain its Time-Current characteristic
- (2) Use Buchholz relay for transformer protection.
- (3) Use thermal overload relay for protection of motor and set the relay properly.
- (4) Check the Polarity of C.T. & P.T. And connect it with the relay.
- (5) Apply the balance current protection scheme using appropriate switch gear.
- (6) Find the fusing factor of a given fusing material.
- (7) Operate air break C.B in a simulated condition.
- (8) Read and interpret the protection scheme for an alternator in power station.
- (9) Read and interpret various protective scheme used for transmission lines and feeders.
- (10) Draw schematic diagram of protective schemes for 66 KV/ 132 KV/220 KV Sub-station.
- (11) Visit a substation and prepare its technical report emphasizing on control side.

Semester V

Diploma in Electrical Engineering

**DEE 506 : ELECTRICAL INSTALLATION AND MAINTENANCE LAB**

0L+0T+4P+2C

MM100

**LABORATORY EXPERIMENTS:**

- (1) Prepare a foundation for installation of electrical machines (rotating & static)
- (2) Install small static/rotating electrical machines equipment and prepare its report.
- (3) Measure Insulation Resistance of a winding/ cables/ wiring and write the procedure.
- (4) Measure earth resistance of installation in building/ domestic fitting & appliances etc. and reduce the same, if necessary through appropriate method and prepare its report.
- (5) Perform various tests applied to insulating oil.
- (6) Prepare plate/ pipe earthings as per I.S. And measure the earth resistance.
- (7) Install a cable in your premises by direct laying method.
- (8) Trouble shooting of an induction motor.
- (9) Dismantle and trouble shoot of ceiling fan.
- (10) Use of following,
  - (a) Bearing puller tools
  - (b) Filler gauge
  - (c) Different types of spanners
  - (d) Cork screw driver
- (11) Use of following instruments
  - (a) Megger
  - (b) Clap-on- meter
  - (c) Multi-meter
  - (d) Stroboscope
  - (e) Earth tester
  - (f) Phase sequence indicator
  - (g) Growlar
- (12) Locate cable fault using cable fault locator/cable testing equipment.
- (13) Read and interpret I.E. rules pertaining to safety.

**Semester V**

**Diploma in Electrical Engineering**

**DEE 507 : ELECTRIFICATION OF BUILDING AND COMPLEX LAB**

**0L+0T+2P+1C**

**MM100**

**LABORATORY EXPERIMENTS:**

1. Draw a complete wiring diagram, and prepare a blue print of any one of the complexes. (Cinema, hotel, library, cultural hall, hospital etc. a group of 4 students, having one different complex-per group).
1. Study a large building or complex electrification tender.
2. Estimation costing and design of any given high rise building.
3. Economical illumination system design for any complex, building.
4. Study of safety management in electrical installation in a high rise building.
5. Load calculation for lift, escalators, air conditioning in high rise building.
6. Prepare field visit report (Important observations) of any high-rise building or complex.

Semester V

Diploma in Electrical Engineering

**DEE 508 : CONTROL SYSTEM LAB**

0L+0T+4P+2C

MM100

**LABORATORY EXPERIMENTS:**

1. To determine response of first order and second order systems for step input for various values of constant 'K' using linear simulator Module and compare theoretical and practical results.
2. To study P, PI and PID temperature controller for an oven and compare their performance.
3. To study and calibrate temperature using resistance temperature detector (RTD)
4. To design Lag, Lead and Lag-Lead compensators using Bode plot.
5. To study DC position control system
6. To study synchro-transmitter and receiver and obtain output V/S input characteristics
7. To determine speed-torque characteristics of an AC servomotor.
8. To study performance of servo voltage stabilizer at various loads using load bank.
9. To study behaviour of separately excited DC motor in open loop and closed loop conditions at various loads.
10. To study PID Controller for simulation proves like transportation lag.

**Semester V**

**Diploma in Electrical Engineering**

**DEE 509 : PROJECT WORK AND INDUSTRIAL TRAINING**

**0L+0T+4P+2C**

**MM100**

Students will attend industrial training of four weeks in any industry or reputed organization after IV semester examination in summer vacation. The evaluation of this training shall be included in the V semester evaluation.

The students will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training.

Students will also be required to prepare an exhaustive technical report of the training during the V semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in charge of the training. The officer-in-charge of the trainee would also give his rating of the student in the standard university format in a sealed to the higher authority.

The students at the end of the V semester will present his report about the training before a committee constituted by the Dean Engineering which would be comprised of at least three members comprising of the department coordinator, class coordinator and a nominee of the Dean Engineering. The students guide would e a special invitee to the presentation. The seminar session shall be an open house. The internal marks would be the average of the marks given is an open house session. The internal marks would be the average of the marks given is each member of the committee separately in a sealed envelope to the Dean Engineering

The marks by the external examiner would be based on the report submitted by the students which shall be evaluated by the external examiner and cross examination done of the student concerned. Not more than three students would form group for such industrial training/project submission

Semester V

Diploma in Electrical Engineering

**DEE 510 : CAMPUS RECRUIDMENT TRAINING -I**

**0L+0T+2P+1C**

**MM100**

As a part of the curriculum, the Campus Recruitment Training (Technical) forms an important component of education for Diploma student. It is an attempt to bridge the gap between conventional study and competitive exam study or campus placement. The Program, which would be a help in government jobs as well as top private companies. In the process, it provides training for the students to improve their technical skill as per requirement. This program benefits the student to understand what he/she has studied in the class room and what is being practiced in competitive exam for government and private jobs.

In this program technical preparation according to competitive exam will be done in the field of Electrical Engineering. Major technical subjects **Electrical Machines:** DC machines, Induction Machines, Synchronous machines, Transformers, **Circuit Theory:** Network Theorem, Graph Theory, AC Network, Transient Analysis, Two port network, **Electrical Measurement:** measurement of resistance, Inductance and Capacitance, Potentiometer, DC and AC bridges, Moving coil, Moving Iron, Dynamometer, Induction type meter, measurement of Power, Energy and Frequency, Transducers are covered in stage first. The program mainly focuses on multiple choice question which help students for their preparation.

Semester VI

Diploma in Electrical Engineering

**DEE 601 : ELECTRICAL ESTIMATING, COSTING AND CONTRACTING**

2L+1T+0P+2.5C

MM100

**MODULE-I ELEMENTS OF ESTIMATING, DOMESTIC AND INDUSTRIAL WIRING:** Definition of “Estimation”. Types of estimation and estimation tools. Overhead and service charges. Purchase procedure. Layout and wiring diagram for residential building and industrial wiring. Selection of number of circuit for project as per IE rules. Estimation of residential wiring and industrial wiring. I.E. rules observed for above wiring.

**MODULE-II ESTIMATING AND COSTING OF SERVICE CONNECTION (DOMESTIC & INDUSTRIAL):** Survey work for domestic and industrial service connections, Layout/wiring diagram of service connection (given project work) List of materials and accessories along with specifications required for given project work. Estimation of service connection for domestic and industrial(1phase and 3 phase) service connections. I.E. rules pertaining to above wiring.

**MODULE-III ESTIMATION OF OVERHEAD AND UNDERGROUND DISTRIBUTION SYSTEM:** Survey work for estimation of overhead and underground distribution system. Planning and layout of project. List of materials and accessories required for the given project. Procedure for preparing estimate for 440 V, 3 phases, 4 wires or 3 wire overhead and underground distribution system. Drawing/sketches of overhead and underground service connection. I.E. Rules pertaining to above project.

**MODULE-IV ESTIMATING AND COSTING OF ELECTRICAL PRODUCT, REPAIRS AND MAINTENANCE OF ELECTRICAL DEVICES AND EQUIPMENT:** Market survey for cost of given product like D.O.L. starter, small motor, mono block pump, automatic electric iron, table/ceiling fan, ICDP/ICTP switch etc. Preparation of detailed drawing work of the product. Preparation of material quantity sheet for the product. Market survey for availability of required materials, their cost and other requirements. Preparation of cost schedule of product. Find out cost of product considering material cost, labour cost and overhead charges. Validation of cost schedule. Financial arrangement for the product. Location of fault. Materials required and their cost for remedial measure of fault. Estimation of repairing cost. Estimation of maintenance, servicing and testing cost including labour cost(service charge)Tools used for repairs & maintenance work Detailed estimation and preparation of cost schedule for repair and maintenance of electric fan, automatic electric iron, single phase transformer, mixy, D.O.L. starter etc.

**MODULE-V PRINCIPLES OF CONTRACTING :** Terms & conditions, types of contract system. Tender, tendering procedure and preparation of simple tender. Terms & conditions of tender, procedure for inviting and scrutinising of tender. Importance of Earnest Money Deposit, Security Deposit and S.O.R.

**Text/Reference Books**

1. Electrical wiring, estimating & costing, S.L. Uppal, Khanna Publisher
2. Electrical costing, estimating & contracting, S.K. Bhattacharya, TTTI- Chandigarh.
3. Electrical estimating & costing, M.N. Bajpai, Saroj publication. .
4. S.O.Rs of P.W.D. Govt. Departments.

Semester VI

Diploma in Electrical Engineering

**DEE 602 : ELECTRONICS & ELECTRICAL DESIGN AND DRAWING**

2L+1T+0P+2.5C

MM100

**MODULE-I TRANSFORMER DESIGN & PANEL WIRING DIAGRAM FOR USUAL PROTECTIVE DEVICES:** Single phase and three-phase core type distribution transformer Single phase shell type transformer Output equation Main dimension of frame Core design and winding design.

**Panel Wiring Diagram:** Synchronization and parallel operation of 3-phase alternators A.C. 3-phase squirrel cage induction motor, A.C 3-phase slip ring induction motor. Parallel operation of three phase transformers D.C. compound generator Parallel operation of D.C. compound generators

**MODULE-II DESIGN OF WINDING:** Definition of Single and double layer winding Full pitch and short pitch winding Integral and fractional winding Developed winding diagrams of single phase and three-phase induction motors Developed winding diagrams of alternators

**MODULE-III D.C. MACHINE DESIGN:** Choice of specific magnetic and specific electric loading Output equation Armature Design) Calculation of main dimensions output coefficients Choice of number of poles Design of shunt field winding

**MODULE-IV 3-PHASE INDUCTION MOTOR DESIGN:** Choice of specific magnetic and specific electric loading Output equations Calculation of main dimensions Relation between D and L Effect of length of air gap on motor performance Calculation of no load current

**MODULE-V SIMPLE ALARM AND SIGNAL CIRCUITS:** Using contactors, designing and drawing schematic and wiring diagrams of alarm and signal circuits. Circuits should involve use of switches, push buttons, bells, indicating light which are used in offices, hospitals, hotels and buses

**Contactor Control Circuits:** The circuit should incorporate remote control, interlocking, time delay, sequential operation, overload short circuit and no-load protection applicable to D.O.L starter Star-Delta starter Rotor resistance and reversing starters Contactor control schematic and wiring diagram for speed reversing of motors. Contactor control schematic and wiring diagram for fast and slow speeds of motors contactor control schematic and wiring diagram of sequential operation of motors control of pump motor with water level indicators.

**REFERECE BOOKS:**

1. Electrical Design, K.B. Raina, New Age International
2. Electrical Machines Design A.K. Shawney, Dhanpat Rai Publications
3. Electrical Drawing and Design Neil Sclater, McGraw-Hill Professional publication
4. Electrical Machines Design, V.N. Mittal, Standard Publishers
5. Electrical Engineering and Drawing, Surjit Singh, Katson Publicaions

Semester VI

Diploma in Electrical Engineering

**DEE 603 : POWER SYSTEM ANALYSIS**

3L+0T+0P+3C

MM100

**MODULE I ECONOMIC ASPECTS OF GENERATION:** Factor affecting the cost of generation  
Cost reduction by power station inter connection Load curves, load duration curves calculation of cost per unit Need of improvement of power factor Incremental rate of generation and condition for economic loading.

**MODULE II COMBINED OPERATION OF POWER STATIONS:** Advantage of interconnection Base load, peak load and load allocation among different power station Effect of change in excitation and change in fuel supply on load sharing of alternator, Load frequency control.

**MODULE III VOLTAGE REGULATION IN POWER SYSTEM:** Control of generator voltage Tap changing transformer Shunt capacitors and synchronous phase modifier Series capacitors, shunt reactors and static VAR compensators

**MODULE IV POWER SYSTEM STABILITY:** Power angle diagram and maximum steady state power Steady state stability and its improvement Transient stability, swing equation and introduction to equal area criterion

**MODULE V EHV TRANSMISSION:** Requirement and design consideration of EHV lines Selection and spacing of conductor Corona and radio interference Insulation requirement

**HVDC Transmission:** Limitation of high voltage ac transmission Advantages and limitation of HVDC transmission, Principal parts of generating station Application of HVDC system HVDC system in India

**Text/Reference Books**

1. Generation of Electrical Power, B.R. Gupta, KAtson Publications
2. Power System Design M.V. Despandey, TMH Publications
3. Electrical Power System, Nagrath & Kothari, TMH Publications
4. Elements of Power system Stevenson, TMH Publications

Semester VI

Diploma in Electrical Engineering

**DEC 603 : MICROPROCESSOR AND MICROCONTROLLER**

3L+0T+0P+3C

MM100

**MODULE-I INTRODUCTION:** Evolution of microprocessor, Digital computer, Organisation of computer, Definition of, Instruction, Program, Machine language, Assembly language, High level language, Compiler and Assembler

**MODULE-II NUMBER SYSTEMS:** Decimal, hexadecimal, binary and octal numbers and conversion of one number system to another, 1's complement, 2's complement, Binary addition, Binary subtraction using 1's complement and 2's complement

**MODULE-III MICROPROCESSORS ARCHITECTURE (INTEL 8085):** Functional block diagram, Pin-Out diagram with description, Buses, Address bus, Data bus, Control bus, Registers, Arithmetic and logic unit, Timing and control unit, Types of instructions and classification into groups, Types of addressing modes, Status flags

**MODULE-IV PROGRAMMING AND APPLICATION OF MICROPROCESSOR:** Some examples of assembly language programme, Introduction to circuits (block diagram only) used in electrical application, ADC, DAC, Analog Multiplexer, Sample and Hold, Programmable peripheral interface (PPI)

**MODULE-V MEMORY I/O INTERPHASING AND APPLICATIONS OF MICROPROCESSOR:** Schematic diagram of memory chips decoder, memory inter-phasing. Memory I/O data transfer scheme. Peripheral devices like 8155/8156/8255. Inter-phasing of switches, LEDs, Temperature control of furnace using microprocessor, traffic light control, SCR firing angle control, Data acquisition system.

**Text/Reference Books:**

1. Electrical and Electronic Measurement & Instrument, S. Rambhadran
2. Electrical and Electronic Instrumentation, A.K. SAWNY, Dhanpat Rai Pub
3. Mechanical and Industrial Measurement, R.K. Jain, Khanna Publishers
4. A work book on instrumentation, TTTI-Bhopal

Semester VI

Diploma in Electrical Engineering

**DEE 604 : ELECTRICAL ESTIMATING, COSTING AND CONTRACTING LAB**

0L+0T+4P+2C

MM100

**LABORATORY EXPERIMENTS:**

- (1) For a given list of materials, prepare detailed specifications.
- (2) For a given list of materials, prepare purchase procedure report.
- (3) Estimating & costing of a domestic installation cost (Residential building, Laboratory room or Drawing hall etc with concept of illumination design.
- (4) Estimating & costing of industrial installation. (Work shop, agriculture, flour mill etc)
- (5) Estimating & costing of overhead service connection. (1 phase and 3 phases)
- (6) Estimating & costing of underground service connection (1 phase and 3 phase)
- (7) Estimating & costing of overhead, 440 V, 3-phase, 4 wire or 3 wire distribution line.
- (8) Estimating & costing of underground, distribution line using 3 core or 4 core cable for a connected load.
- (9) Estimating and costing of any one Electrical Product.
- (10) Estimating and costing of repairs and maintenance of any one domestic appliances.
- (11) prepare a tender notice for given project work.

Semester VI

Diploma in Electrical Engineering

**DEE 605 : ELECTRONICS & ELECTRICAL DESIGN AND  
DRAWING LAB**

0L+0T+4P+2C

MM100

1. Draw electrical and electronic symbols used in electrical and electronic installation like light, power, alarm & control circuits etc.
2. Draw Simple light and Alarm Circuits
  - a. One lamp controlled by two switches(staircase circuit)
  - b. Two lamps controlled by three switches(double staircase circuit)
  - c. Circuit using master switch
  - d. Fluorescent tube controlled from one switch
3. Draw Simple Alarm Circuits
  - a. One bell controlled by one push button
  - b. Two ordinary bells (for day and night)used at a distant residence
  - c. No. of bells controlled by separate switches
  - d. Bell response circuit using one bell and one relay
  - e. Bell response circuit of an office(for three rooms)
  - f. Traffic light control system for two road crossing
4. Design and draw wiring circuit of a two room set for light and fan circuit
  - a. To draw Installation plan and wiring diagram of two house
  - b. Conductor size calculation
  - c. List of material required with cost by doing market survey
  - d. Description of various tests the wiring installation before commissioning
5. Orthographic Projection of Simple Insulators and Fuse
  - a. Kit kat fuse base
  - b. Kit kat fuse carrier
  - c. Bus bar post
  - d. Pin type and shackle type insulator
  - e. Stay insulators
6. Orthographic Projection of Simple Electrical parts
  - a. Engineering transistor
  - b. M.C.B.
  - c. E.L.C.B.Bobbin of a small transformer/choke

Semester VI

Diploma in Electrical Engineering

**DEC 605 : MICROPROCESSOR & MICROCONTROLLER LAB**

**0L+0T+4P+2C**

**MM100**

**LABORATORY EXPERIMENTS:**

1. Study of Intel 8085 microprocessors
2. Program to add two 8-bit numbers
3. Program to subtract two 8-bit numbers
4. Program to find 1's complement of an 8-bit numbers
5. Program to find 2's complement of a 8-bit numbers
6. Program to shift an 8-bit number left by one bit
7. Program to mask of least significant 4 bits of an 8 bit number
8. Program to mask of most significant 4 bits of an 8 bit number
9. Program to find square from look up table
10. Program to find largest of two numbers
11. Program to find smallest of two numbers
12. Program to arrange a series of numbers in descending order
13. Program to arrange a series of numbers in ascending order

Semester VI

Diploma in Electrical Engineering

**DEE 606 : PROJECT WORK AND INDUSTRIAL VISIT**

**0L+0T+6P+3C**

**MM100**

Project work & industrial visit--II is a continuation of project phase I started in the fifth semester. There would be two reviews in the sixth semester, first in the middle of the semester and the second at the end of the semester. First review is to evaluate the progress of the Project work and industrial visit, presentation and discussion. Second review would be a pre-submission presentation before the evaluation committee to assess the quality and quantum of the work done. The final evaluation will be done based on internal as well as external.

Semester VI

Diploma in Electrical Engineering

**DEE 607 : CAMPUS RECRUITMENT TRAINING –II**

0L+0T+2P+1C

MM100

As a part of the curriculum, the Campus Recruitment Training (Technical) forms an important component of education for Diploma student. It is an attempt to bridge the gap between conventional study and competitive exam study or campus placement. The Program, which would be a help in government jobs as well as top private companies. In the process, it provides training for the students to improve their technical skill as per requirement. This program benefits the student to understand what he/she has studied in the class room and what is being practiced in competitive exam for government and private jobs.

Campus Recruitment Training (Technical) II covers **Power Electronics:** SCR, IGBT, GTO, TRIAC, DIAC, single phase converter, three phase converter, Inverter, Voltage Regulator, cycloconverter, chopper. **Control System:** Block Diagram, PID controller, input signals and compensating networks. **Power System:** generation, transmission, line parameters, load flow analysis, Faults, Stability, Economical operation and control. **Microprocessor:** Introductions of 8085, 8086 microprocessor, construction, block diagrams. The program mainly focuses on multiple choice question which help students for their preparation.