DEE 601: UTILIZATION OF ELECTRICAL ENERGY

Credits: 4 **Semester VI**

Module No.	Contents	Teaching Hours
Unit – I	**Electric Drives:** Advantages of electric drives Characteristics of different mechanical loads Types of motors used in electric drive Electric braking Plugging Rheostat braking Regenerative braking **Illumination:** Nature of light, curve of relative sensitivity of human eye and wave length. Definitions : flux, solid angle, luminous intensity, illumination, luminous efficiency, depreciation factor coefficient of utilisation, space to height ratio,reflection factor, laws of illumination. Calculation of number of light points for interior illumination; calculation of illumination at different points; considerations, involved in simple design problems and illumination schemes; levels of illumination. Methods to increase illumination efficiency Different sources of light: Difference in incandescent and discharge lamps – their construction & characterstics, fittings required for filament lamp, mercury lamp, fluorescent lamp sodium lamp, neon lamp. Main requirements of proper lighting; illumination level, absence of flare, contrast and shadow.	16
Unit – II	**Electric Heating ;** Introduction. Advantages of electrical heating. Heating methods: Resistance heating (direct resistance heating, indirect resistacne heating, electric ovens, their temperature range) salt bath heaters properties of heating elements, domestic water heaters and other heating appliances. Induction heating, principle, core type and coreless induction furnace. Electric arc heating, direct and indirect arc heating, arc furnace. Dielectric heating. Applications in various industrial fields, microwave ovens. Simple design problems of resistance heating element. **Electric Cooling** Concept of refrigeration and airconditioning. Brief description of vapour compression refrigeration cycle. Description of electrical circuit used in Refrigerator, (b) Airconditioner, and (c) Water cooler. **Methods of saving Electricity, How to optimally utilize electrical resources,** **Electric Welding:** Welding methods, principles of resistance welding, welding equipment. Electric arc welding principle, characterstics of arc; carbon and metalic arc welding, power supply,advantage of coated electrode, comparison of AC and DC arc welding; welding equipment.	16
Unit - III	**Electrochemical Processes:** Need of electro-deposition. Faraday's laws in electrodeposition. Objectives of electroplating. Description of process for electroplating. Factors governing electro deposition. Equipments and accessories for electroplating plant. Principle of anodising and its applications. Electroplating on non-conducting materials. **Electric Traction:** Concept and configuration of Electric drive and types of electric drive. Advantage of electric traction. Different systems of electric traction, D.C. and A.C. system. Different accessaries for track electrification; such as overhead wires,	16

RECOMMENDED BOOKS

1. Art and Science of Utilization of Electrical Energy by H Partap, Dhanpat Rai & Sons, Delhi
2. Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana
3. A.Text Book. of Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi
4. Modern Electric Traction by H Partap, Dhanpat Rai & Sons, Delhi
5. Utilization of Electrical Energy by OS Taylor, Pitman Publications
6. Generation, Distribution and Utilization if Electrical Power by CL Wadhwa, Wiley Eastern Ltd., New Delhi

DEE 602: ELECTRICAL POWER-II

Credits: 4 Semester VI

Module No.	Contents	Teaching Hours
Unit – I	**Power System Faults** Types of faults, single line to ground, double line to ground, three phase to ground, open conductors, severity of faults and their effects on system, representation of fault condition through single line diagram **Switch gears** Purpose of protective gear. Characteristics of Switch gears Difference between switch, isolator and circuit breakers. Function of isolator and circuit breaker. Making and breaking capacity of circuit breaker (only definition) Principles of Arc extinction by OCB and ACB, Constructional features of OCB, ACB, and their working Circuit breakers. Types of circuit breakers, bulk and minimum oil circuit breakers, air blast circuit breakers, SF6 circuit breakers Miniature circuit breakers ACB, ELCB, MCB, for distribution and transmission system (Descriptive)	12
Unit – II	**Protection Devices** Fuses; function of fuse. Types of fuses, HV and LV fuses, rewire-able, cartridge, HRC Earthing, purpose of earthing: Equipment earthing, Substation earthing, system earthing as per Indian Electricity rules. Relays: Introduction, types of relays. Electromagnetic and thermal relays, their construction and working Induction type over-current, earth fault relays, instantaneous over current relay Directional over-current, differential relays, their functions Idea of static relays and their applications **Protection Scheme** Relays for generator protection Relays for transformer, protection including Buchholtz relay protection Protection of feeders and bus bars. Over current and earth fault protection, distance protection Relays for motor protection	12
Unit - III	**Over-voltage Protection** Protection of system against over voltage; causes of over voltage, function of ground wire Lightning arrestors, Rod gap, horn gap, metal oxide type. Line protection Substation	12

RECOMMENDED BOOKS

1. Testing, Commissioning , Operation and Maintenance of Electrical Equipment by S Rao, Khanna Technical Publication, New Delhi
2. Electrical Power Systems by CL Wadhwa, Wiley Eastern Ltd., New Delhi
3. Textbook of Electrical Technology by BL Theraja, S Chand and Co., New Delhi
4. Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi
5. A Course in Electrical Power by ML Soni, PV Gupta and Bhatnagar, Dhanpat Rai & Sons, New Delhi
6. Principles of Power Systems by VK Mehta, S Chand and Co., New Delhi

7. Preventive Maintenance of Electrical Apparatus by SK Sharotri, Katson Publishing House, Ludhiana

DEE 603: MAINTENANCE AND SERVICING OF ELECTRICAL MACHINES

Credits: 4 **Semester VI**

Module No.	Contents	Teaching Hours
Unit – I	**Scope and Organisation of Electrical Maintenance Department:** Requirement of electrical maintenance department, organisation of work of electrical m/c department, office work and record keeping of electrical maintenance department, history & plant maintenance log book & job cards. **Installation and commissioning:** General guidelines for loading and unloading of heavy electrical machines. Brief description of the accessaries used for loading and unloading of heavy electrical equipement. List of precautions to be taken while executing such jobs. Handling & transport of electrical machine, equipment & line accessaries to site.Installation of electrical equipement like induction motors, transformers, switch gears, transmission and distribution lines etc. Allingment of the equipment, testing and commissioning of different types of electrical equipment, transmission and distribution lines etc. Precautions while installation is in progress. Testing of installation before declaring it to be fit for energising.	16
Unit – II	**Preventive Maintenance of Electrical Equipment and other installations:** Meaning of preventive maintenance, advantages of programmed preventive maintenance, preparation of preventive maintenance schedule for transformers, transmission lines, induction motors, circuit breakers, underground cables, storage batteries etc. **Trouble Shooting:** Causes for failure of electrical equipments, classifcation of faults under (i) electrical, (ii) magnetic (iii) mechanical, tool and instruments used for trouble shooting and repair. Use of trouble shooting charts. Diagnosis of faults in (i) d.c.machines (ii) Synchronous machines (iii) trans- formers, (iv) induction motors, (v) Circuit breakers, (vi) Overhead & underground distribution lines(vii) Storage batteries (viii) other appliances.	16
Unit - III	**Earthing Arrangements.** Reasons for earthing of electrical equipment, earthing systems, permissible earth resistance for different types of installations, methods of improving the earth resistance, measurement of earth resistance. System earthing and equipment earthing. **Insulation Testing:** Classification of insulation as per ISS 1271/1958. Insulation resistance measurement, effect of temperature on resistance, reasons for determination of insulation resistance, methods of improving insulation resistance, vaccum impregnation, transformer oil testing and interpretation of the test results. **Electrical Accidents and Safety:** Classification of electrical accidents, statuory regulations (IS 5216-1969), treatment for electric shock, artificial respiration, types and use of different types of fire extinguishers. Dangerous currents and voltages, effect of current on human body. Step and touch potentials, R.C.Ds. and earth leakage circuit breakers. General ideas about protection against lightning, explosive safety against static and current electricity, important Indian electricity rules.	16

RECOMMENDED BOOKS

1. Testing, Commissioning , Operation and Maintenance of Electrical Equipment by S Rao, Khanna Technical Publication, New Delhi
2. Preventive Maintenance of Electrical Apparatus by SK Sharotri, Katson Publishing House, Ludhiana

DEE 604: CONTROL OF ELECTRICAL MACHINES

Credits: 4 **Semester VI**

Module No.	Contents	Teaching Hours
Unit – I	**Control components** Fuses and combination fuse switch units Miniature circuit breaker Contactors Solenoid type Clapper type Over-load relays Thermal over-load relay Ratchet type over load relay Magnetic over-load relay Dash pot type oil filled relay Timing relays Thermal time delay relay Pneumatic time delay relay Synchronous motor-driven timer Solid state timer Phase failure relay Push-buttons Selector switches (Two position) (Three position) Limit switches Single side actuation type Double side actuation type Rotary cam type Heavy duty limit switch Proximity switches Solenoid valves Master controllers & drum switches Pressure switches Temperature controller (Thermostat) Float switches Mechanical brakes for motors Control transformer Rectifiers Reactors Capacitors Symbols for various components Control diagram Two wire control circuit Three wire control circuit * Study of components in the Lab.	12
Unit – II	**A.C.Control Circuits** Forward/reversing of 3 phase motors With push-button inter-locking With Auxillary contact inter-locking Sequence starting of motors Starting of multispeed squirrel cage motor Dynamic braking of squirrel cage induction motor Plugging of squirrel cage induction motor Over-load protection of motors Single phase protection	12

	Over-temperature protection Voltage stabiliser for 3 phase and single phase motors.	
Unit - III	**Control of Synchronous Motors** Prinicple of acceleration Motor starter with field application by definite time relay Motor starter with field control by polarised field frequency control. Motor starter with feild application by slip frequency relay **Control of Single Phase Motors** Across the line starter Reversal of universal motor Speed control of universal motor Starter for capacitor type split phase motor Dynamic braking **Industrial Control Circuits** Heater control Compressor motor control Skip hoist control Walking beam Battery operated truck Conveyor system control	12

Text Books

1. Asfaq Hussain "Basic Electrical Engineering", Dhanpat Rai
2. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill.

Reference Books

1. A.E. Fitgerald, D.E., Higginbotham and A Grabel, Basic Electrical Engineering, McGraw Hill.
2. H. Cotton, Advanced Electrical Technology, Wheeler Publishing.

DME 606: ENTREPRENEURSHIP DEVELOPMENT & MANAGEMENT

Credits: 4 **Semester VI**

Module No.	Contents	Teaching Hours
Unit – I	Concept and meaning of entrepreneurship. need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for its development, entrepreneurship as a desirable and feasible career option- entrepreneur competencies and attributes- characteristics of a successful entrepreneur. Process of entrepreneurship development	12
Unit – II	Nature, Purpose and pattern of Human Activities: Economic and Non-Economic- Entrepreneurial Pursuits and Human Activities- Need for Creativity and innovation in societies -Building enterprising Personality and Society - Entrepreneurship as a Human Resource Development concept	12
Unit - III	Role of Entrepreneur in Indian economy with reference to self-employment development Employment pattern of the educated in India- Entrepreneurial Culture- Importance of nursing Entrepreneurial culture in developing economies Entrepreneurial Values- Entrepreneurial Discipline and Social Responsibilities, Entrepreneurship Support system as like District Industry Centers (DICs), Commercial Banks, state financial corporations,	12

Reference Books:

1. A Hand book of Entrepreneurship, Edited by BS Rathore and JS Saini, Aapga publications, Panchkula Haryana.
2. Entrepreneurship Development By CB Gupta and P Shrinivasan,Sultan chand and sons, New Delhi.
3. Dynamics of Entrepreneurship development and management (ivth) edition by Shri Vsant Desai.
4. Entrepreneurship development by Shri S.S. Khanka.
5. Entrepreneurship by NITTT& R Chennai

DEE 651: Electrical Power – II Lab

Credits: 2 Semester VI

Module No.	Contents	Teaching Hours
1	To Determine the Negative Sequence and zero sequence reactance's of and Alternator.	48
2	To Study the single line to ground fault and verify results with the theoretical value.	
3	To Study the Distance Relays (MHO Relays)	
4	To Study the Operation of a solid state over voltage relay and hence to obtain its voltage characteristic.	
5	To Study the Operation of solid state under voltage relay and hence to obtain its voltage characteristic.	
6	Fault Location in cable by Murray loop.	
7	Over Voltage relay.	