


LESSON PLAN

Gp Kangra		Department: Electrical Engineering		Subject : UEE		
Syllabus Coverage		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 56		Theory : 56		
Sr. No.	Period Nos.	Topic	Details	Instruction reference	Additional Study Recommended	Remarks
1	09 (01-09)	Electric Drives	1.1 Advantages of electric drives 1.2 Characteristics of different mechanical loads 1.3 Types of motors used as electric drive 1.4 Electric braking 1.4.1 Plugging 1.4.2 Rheostatic braking 1.4.3 Regenerative braking 1.5 Methods of power transfer by direct coupling by using devices like belt drive, gears, chain drives etc. 1.6 Examples of selection of motors for different types of domestic loads 1.7 Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane and lift etc. Application of flywheel.	Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana	Art and Science of Utilization of Electrical Energy by H Partap, DhanpatRai& Sons, Delhi	
2	09 (10-18)	Illumination	2.1 Nature of light, visibility spectrum curve of relative sensitivity of human eye and wave length of light 2.2 Definition: Luminous flux, solid angle, luminous intensity, illumination, luminous efficiency, depreciation factor, coefficient of utilization, space to height ratio, reflection factor, glare, shadow, lux level 2.3 Laws of illumination 2.4 Different type of lamps, construction and working of incandescent and discharge lamps – their characteristics, fittings required for filament lamp, mercury vapour sodium lamp, fluorescent lamp, halogen lamp, neon lamp, compact fluorescent lamp, LED lamps 2.5 Main requirements of proper lighting; absence of glare, contrast and shadow 2.6 Illumination requirement for street lighting, flood lighting, monument lighting and decorative lighting 2.7 LED based lightening, advantages of LED based lightening	Utilization of Electrical Energy by Sahdev, Unique International Publication, Jalandhar		

3	09 (19-27)	Electric Heating	<p>3.1 Advantages of electrical heating</p> <p>3.2 Heating methods:</p> <p>3.2.1 Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, thermostat control circuit</p> <p>3.2.2 Induction heating; principle of core type and coreless induction furnace, their construction and applications</p> <p>3.2.3 Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace</p> <p>3.2.4 Dielectric heating: working and applications in various industrial fields</p> <p>3.2.5 Infra-red heating and its applications</p> <p>3.2.6 Microwave heating and its applications</p>			
4	05 (28-32)	Electric Welding	<p>4.1 Advantages of electric welding</p> <p>4.2 Welding method</p> <p>4.2.1 Principles of resistance welding, types – spot, projection, seam and butt welding, welding equipment</p> <p>4.2.2 Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc, hydrogen arc welding method and their applications. Power supply requirement. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits, welding of aluminum and copper</p>			
5	05 (33-37)	Electrolytic Processes	<p>5.1 Need of electro-deposition</p> <p>5.2 Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing and buffing</p> <p>5.3 Equipment and accessories for electroplating</p> <p>5.4 Factors affecting electro-deposition</p> <p>5.5 Electroplating of non-conducting materials</p>			
6	05 (38-42)	Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers	<p>6.1 Principle of air conditioning, vapour pressure, refrigeration cycle, eco-friendly refrigerants</p> <p>6.2 Description of Electrical circuit used in</p> <p>a) Refrigerator,</p> <p>b) Air-conditioner, and</p> <p>c) Water cooler</p>			


7	14 (43-56)	Electric Traction	<p>7.1 Requirement of ideal traction system, Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main line and their speed-time curves, Advantages of electric traction</p> <p>7.2 Different accessories for track electrification; such as overhead catenary wire, conductor rail system, current collector-pentagraph</p> <p>7.3 Electrical block diagram of an electric locomotive with description of various equipment and accessories used</p> <p>7.4 Types of motors used for electric traction</p> <p>7.5 Starting and braking of electric locomotives</p> <p>7.6 Introduction to EMU (Electrical multiple unit) and metro railways</p> <p>7.7 Modern electrical traction system, their features and advantages</p>			
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Date: 20-12-2019	

LESSON PLAN

GP Kangra		Department: Electrical Engineering		Subject : TMEM		
		Course : Diploma		Duration: 3 Yrs.		
SYLLABUS COVERAGE		Total Period: 56		Theory : 56		
Sr. No.	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1	1-4	1. Safety & Prevention of Accidents	Definition of Safety, Hazard, accident, major accident hazard, responsibility, authority, accountability, Monitoring. Need of Safety, I.E. Rules & Statutory regulations for safety of persons & equipment in electrical installation, Dos & don'ts for Substation operators, Causes of electrical accidents, severity of shock, Procedure for rescuing the person who has received an electric shock, methods of providing artificial respiration, Precautions to be taken to avoid fire due to electrical faults, various measures to prevent electrical accidents, types and operation of fire extinguishers.	1. Operation and Maintenance of Electrical Machines- Vol-I & II 2. Handbook & Journals on Preventive Maintenance by C. J. Hubert 3. Installation, Maintenance and Repair of Electrical Machines and Equipment by Madhvi Gupta, KATSON Publication	1. Electrical Workshop Practices by Dr. Umesh Rathore & Naresh K. Sharma, KATSON Publication New-Delhi 2. A Course Electrical Installation, Estimating Costing by J. Gupta, KATSON Publication	
2	5-12	2. Introduction to Testing & Maintenance of Machines	Objectives of Testing, Concept of tolerance, Routine tests, Special tests, Methods of testing: Direct, Indirect and Regenerative, Concepts of preventive, predictive, and breakdown maintenance, Advantages of maintenance, Preventive maintenance schedule, Introduction to Total Productive Maintenance.			
3	13-22	3. Testing & Maintenance of Rotating Electrical Machines	Type tests, routine tests & special tests of single and three-phase Induction motors, Routine, Preventive, & breakdown maintenance of Single & 3-phase Induction motors as per IS 9001:1992. Maintenance schedule of alternators & synchronous machines as per IS 4884-1968. Brake test on DC Series motor.			
4	23-31	4. Testing & Maintenance of Transformers	Procedure for conducting following tests on Transformers: Measurement of winding resistance, no load losses, & no load current, impedance, voltage, load losses, Insulation resistance, Induced over voltage withstand test, separate source voltage withstand test, Impulse voltage			


			<p>withstand test, Temperature rise test of oil & winding. Different methods of determining temp rise in transformer: back to back test, short circuit test, open delta (delta -delta) test. Preventive maintenance & routine maintenance of distribution transformer as per I.S. Periodic checks for replacement of oil, silica gel, parallel operation of single & 3-phase transformer, load sharing calculations</p>		
5	32-35	5. Testing & Maintenance of Insulation	<p>Classification of insulating materials as per I.S, factors affecting life of insulating materials, measurement of insulation resistance & interpretation of condition of insulating. Methods of measuring temperature of internal parts of windings/machines & applying the correction factor when the machine is hot. Properties of good transformer oil, Causes of contamination of insulating oil, Procedure of acidity test, sludge test, crackle test and flash point test, Need and method of Filtration of Transformer oil, Methods of cleaning the insulation covered with loose, dry dust, sticky dirt, & oily viscous films, procedure for cleaning, washing & drying of insulation, re-varnishing, Methods of internal heating & vacuum impregnation.</p>		
6	36-46	6. Trouble Shooting of Electrical Machines & Switchgear	<p>Significance of Trouble Shooting of electrical machines, procedure of trouble shooting, Internal and External causes of Equipment failure. Various types of faults (mechanical, electrical & magnetic) in electrical machines and reason for their occurrence, Use and application of following tools in Troubleshooting: Bearing puller, Filler gauge, Dial indicator, Spirit level, Megger, Earth tester, Growler, Multimeter, Trouble shooting charts for Single & 3-phase Induction Motor, Transformers. Common troubles in electrical installation, maintenance & trouble shooting of LV switchgear like MCCB, ELCB, contactors & batteries.</p>		

7.	47-56		<p>Factors involved in designing the machine foundation, Requirement of different dimension of foundation for static & rotating machines, procedure for levelling & alignment of two shafts of directly & indirectly coupled drives, effects of misalignment, Installation of rotating machines as per I.S. Use of various devices & tools in loading, unloading, lifting, and carrying heavy equipment.</p>			
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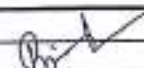
GP Kangra		Department: Electrical Engineering		Subject : EP-III		
SYLLABUS COVERAGE		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 56		Theory : 56		
Sr. No.	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1	1-6 (06)	1. Introduction to Switchgear	1.1 Switchgear, Essential features of Switchgear 1.2 Switchgear elements and its operation 1.3 Bus-bar arrangements 1.4 Concept of short-circuit, short circuit current 2.1 Types of faults: symmetrical faults, unsymmetrical faults 2.2 Unsymmetrical faults: Analysis of L-to-L, L-to-G and L-L-to-G faults	Principles of Power Systems by V.K. Mehta, S Chand and Co., New Delhi	1. Electrical Power Systems by CL Wadhwa, Wiley Eastern Ltd., New Delhi	
2	7-14 (08)	2. Power System Faults	3.1 Advantages and disadvantages of fuse 3.2 Desirable characteristics of fuse element, fuse element materials 3.3 Important terms related to fuse: current rating of fuse element, fusing current fusing factor, cut-off current, arcing time and breaking capacity 3.4 Types of fuse: LV fuse and HV fuse 3.5 LV fuse: semi-enclosed rewritable fuse and HRC fuse-their construction and working 3.6 HV fuse: cartridge type, liquid type and metal clad type-their construction & working	2. A Course in Electrical Power by A. Chakaraborty, M. L. Soni, P. V. Gupta and Bhatnagar, Dhanpat Rai & Sons, New Delhi	2. Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi	
3	15-18 (04)	3. Fuses	4.1 Difference between Switch, Isolator and Circuit Breakers 4.2 Function of Isolator and Circuit breaker 4.3 Difference between Fuse and Circuit Breaker 4.4 Arc phenomenon in circuit breaker: principles and methods of arc extinction. 4.5 Terms related to circuit breaker: arc voltage, re-striking voltage and recovery voltage	3. Testing, Commissioning, Operation and Maintenance of Electrical Equipment by S Rao, Khanna Technical Publication, New Delhi	3. Preventive Maintenance of Electrical Apparatus by SK Sharotri, Katson Publishing House, Ludhiana	
4	19-30 (12)	4. Circuit Breakers			4. Electrical Power Systems by B. M. Weedy, Wiley Publishing	

			<p>4.6 Construction, working principles, types and applications of Air-Blast Circuit Breaker, Oil Circuit Breaker, Vacuum Circuit Breaker and SF₆ Circuit Breaker, Comparison between various types of Circuit Breakers in terms of their features and application areas.</p> <p>4.7 Circuit breaker rating: breaking capacity, making capacity and short-time rating</p>			
5.	31-42 (12)	5. Protective Relays	<p>5.1 Introduction: fundamental requirement of relay, function of relay</p> <p>5.2 Electromagnetic attraction type relay</p> <p>5.3 Electromagnetic induction type relays</p> <p>5.4 Instantaneous relay, Inverse Time Relay, Definite Time lag relay</p> <p>5.5 Relays Terminology: Pick-up Current, Current Setting, Plug Setting Multiplier (PSM), Time Setting Multiplier (TSM), Time/PSM Curve</p> <p>5.6 Distance or Impedance Relay: definite-distance and time distance impedance relay</p> <p>5.7 Differential Relays: current differential and voltage balance differential relay</p> <p>5.8 Brief idea of Static and Microprocessor based relays & their applications</p>			
6.	43-50 (8)	6. Protection Schemes in Power System	<p>6.1 Differential Protection Scheme for Alternators</p> <p>6.2 Protection Schemes for Transformer, Buchholz relay</p> <p>6.3 Merz-price voltage balance protection scheme for bus-bar and transmission line</p> <p>6.4 Earth fault or Leakage Protection</p>			
7.	51-56 (6)	7. Over-voltage Protection	<p>7.1 Introduction: voltage surge, causes of overvoltage</p> <p>7.2 Lightning, lightning arresters such as rod gap, horn gap, multi-gap, expulsion type and valve type arrester</p> <p>7.3 Brief idea about surge absorber</p> <p>7.4 Transmission Line and substation protection against over-voltages</p>			

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LESSON PLAN

Gp Kangra		Department: Electrical Engg. Subject : Estimating & costing in Electrical Engg.				
Syllabus Coverage		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 56		Theory : 56		
Sr. No.	Period Nos.	Topic	Details	Instruction reference	Additional Study Recommended	Remarks
1	14 (1-14)	Introduction	Estimating, Purpose of estimating and costing, proforma for making estimates, catalogue, costing, price list, tender document, net price list, market survey, overhead charges, labor charges, electrical point method and fixed percentage method, contingency, profit, purchase system, enquiries, comparative statements, orders for supply, payment of bills. Tenders – it's constituents, types and procedure.	A Course in Electrical Installation, Estimating and Costing by J.B. Gupta,	Estimating and Costing by Surjeet Singh, Dhanpat Rai & Co., New Delhi	
2	14 (15-28)	Wiring Systems and Protection Devices	Cleat, batten, casing capping and conduit wiring, comparison of different wiring systems, selection and design of wiring schemes for particular situation (domestic and Industrial). Selection of wires and cables, wiring accessories and use of protective devices such as fuse, MCB, ELCB and their selection. Use of wire-gauge and tables.		Electrical Estimating and Costing by N Alagappan and B Ekambaram, TMH, New Delhi	
3	22 (29-50)	Estimating and Costing of Domestic & Industrial Electrical Installations	3.1 Domestic installations: Standard practices as per IS and IE rules. Planning of circuits, sub-circuits and position of different accessories, electrical layout, preparing estimates including cost as per schedule rate pattern and actual market rate. 3.2 Industrial installations: relevant IE rules and standard practices, planning, designing and estimation of installation for single phase motors of different ratings, electrical circuit diagram, starters, preparation of list of materials, estimating and costing exercises on workshop with single-phase, 3-phase motor load and the lighting load (3-phase supply system). 3.3 Service line connections estimate for domestic and Industrial loads (overhead and Under- ground connections) from pole to energy meter. 3.4 Earthing Systems Estimation: IS specifications regarding earthing, types of earthing, List of materials required for earthing, Design of earth wire/strip and electrode for domestic and industrial installation.	Electrical Design, Estimating and Costing by K. B. Raina & S. K. Bhattacharya, McGraw Hill Book Company, New Delhi	A Textbook on Electrical Workshop Practices by Dr. Umesh Rathore and Naresh Kumar Sharma, KATSON Publication, New Delhi	
4	14 (51-64)	Estimating of Transmission/ Distribution Lines & Substations	4.1 Transmission and distribution lines (overhead and underground) planning and designing of lines with different fixtures, based on unit cost calculations. 4.2 Substation: Types of substations, substation schemes and components, estimate of 11/0.4 kV pole mounted substation up to 200 kVA rating, earthing of substations, Key Diagram of 66 kV/33kV/11kV Substation.			

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Gp Kangra		Department: Electrical Engineering		Subject : Energy Management		
Syllabus Coverage		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 56		Theory : 56		
Sr. No.	Period Nos.	Topic	Details	Instruction reference	Additional Study Recommended	Remarks
1	10 (1-10)	Review of Various Energy Sources	Brief overview of present energy scenario in India and worldwide, brief overview of share (in %age) of various energy sources in present energy scenario in India & worldwide, Basic concept and importance of Energy Management.			
2	22 (11-32)	Energy Conservation	<p>Energy Conservation and its Need</p> <p>Energy Conservation opportunities & energy efficient technologies in domestic and industrial sectors:</p> <ul style="list-style-type: none"> - Energy Efficient lighting: Methods/Technologies of energy efficient lighting systems. - Heating: Energy efficient Methods/Technologies for energy savings in Furnaces, Ovens, Boilers, Heat Exchangers, Cooling Towers, and Pumps. - Cooling Systems : Methods/Technologies for Energy Savings in Ventilating systems and Air Conditioners (HVAC Systems) - Energy Efficient Motors, Soft Starters, and Variable Frequency Drives. - Power Factor improvement devices and their significance in energy conservation. - Amorphous Core Transformers 	Generation Distribution and Utilization of Electrical Energy By C.L. Wadhawa		

3	10(33-42)	Energy Conservation in Transmission and Distribution Systems	Reactive power compensation, Demand Side Management, Losses in transmission and distribution system and its minimization			
4	16(43-58)	Energy Audit	Need of Energy Audit, Types of Energy Audit: Preliminary Audit, General or Mini audit, and Comprehensive Audit, Energy Audit methodologies/Procedure, Energy Flow Diagram and its importance. Measurements in energy audit, List of measuring instruments and equipment used in energy audit, Questionnaires for the energy audit, Energy audit checklist, Calculation of payback period, Case studies (any Two) of Energy Audit of any Commercial building and Small Industrial installation.	Electric Power Distribution System Engg by T.Gonen	Energy conservation Guide book	
5	6 (59-64)	Energy and Environment	Environment and social concerns related to energy utilization, Environment impact assessment and its need, Environmental impact assessment in India. RECOMMENDED			

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