Course Name : Electrical Engineering Group

Course Code : EE/EP

Semester : Fourth

Subject Title : Industrial Electrical Systems - I

Subject Code : 17416

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	01	02	03	100	--	25#	25@	150

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

A diploma engineer is required to work as supervisor & knowledge worker in different organizations and is responsible to provide electrification. Maintain supply prepare design, estimates, read drawing, IE rules, data tables, specification, for all types electrical installation, Provision & maintaining earthing & all protective devices like MCCB,ELCB etc. Also Knowledge of maintenance, LT Lines, transformers, types of cables & wires are essential. Hence this core subject has been included at fourth semester in this curriculum.

General Objectives:

The Students will be able to: -

1. Read & interprets Electrical Installation drawings.
2. Understand & apply IE rules.
3. Make use of data tables & specification of wire, cables, LT lines & Distribution Transformer, MCCB, ELCB.
4. Understand principles & procedures of earthing.
5. Know basic terms to prepare design & estimate of installation.
6. Understand & apply procedures for contracts & tenders.

Learning Structure:

Application:

Estimating & costing of Residential, Commercial & Industrial Electrical Installation and prepare tendering documents, Testing of Electrical Installation and Evaluation & billing of executed work

Procedure:

Tender & Tendering documents

Testing of Electrical Installation as per IS

To prepare the schedule of Material

Costing of Material, Labour, Overhead, contingencies

Execution of work as per plan

Circuit design and wiring design procedure for each type of Installation

Selection of Rating and Size of conductor & Conduit, main switch, Distribution board, Bus bar etc., Selection & Rating of protective devices & ear thing of Installation, Selection & Rating of Accessories required for Installation

Position of equipment in Installation, Deciding the path of wiring cable and conduit & ear thing

Principles

Design consideration of Electrical Installation, Principles of circuit design for each type of Installation, Principles of execution of work

Concepts

Residential, commercial and Industrial wiring, Lighting and power circuit, wires, cables, overhead and underground wiring, earthing

Facts

Electrical Engineering Drawing, IE rules applicable to Residential, Commercial & Industrial Installation, General rules & Guidelines for Residential, Commercial & Industrial Installation, Data tables of conductor, Material and Accessories, Various plans & diagrams related to electrical Installation

Theory:

Topics and Contents	Hours	Marks
1. Drawings and IE rules Specific Objectives ➢ Understand different types of electrical Installation ➢ Know and read Electrical drawings & symbols ➢ Know IE rules --- • Classification of electrical installations • General requirements of electrical installation • Reading & interpretation of electrical engineering drawings & symbols related to installations • Representation of different types of diagrams, such as schematic, circuit, wiring diagram and its single line representation as per IS code. • IE rules related to electrical installation	04	10
2. Service connections Specific Objectives ➢ Select appropriate method for service connection ➢ Differentiate between various service connections • Concept of service connection • Types of service connections and their features • Methods of installation of service connection • Differentiate between underground and overhead service connection • Service connection for 11 KV H. T. Consumer	04	10
3. Electrification of residential Installation Specific Objectives ➢ Select wires and wiring methods as per the requirement ➢ Prepare comparison chart of various wiring accessories ➢ Use given guidelines for residential installation ➢ Calculate total electrical load • Types of wires and wiring methods as per IS No. • General rules and guidelines for installation of residential electrification and positioning of equipments • Calculation of total electrical load in the residential installation • Procedure for the design of number of sub circuits • Method of drawing single line diagram • Selection of type of wire and wiring method • Load calculation and selection of size of wire by considering overload and future expansion • Determine length of batten and length of wire • Selection of rating for main switch, distribution board ,MCB,ELCB, and wiring accessories • Purpose of earthing and types of earthing • Determine length and size of earth wire • Prepare list of material for residential installation with their costing • Total estimation and costing of overall residential installation with proper cost of material , labour charges , contingencies charges • Determine per point charges • Wiring diagram for residential installation: Single Line and multiline	12	24

representation.		
4. Electrification of Commercial Installation Specific Objectives ➢ Difference between residential and commercial installation ➢ Prepare comparative chart for different ratings, size & other technical specifications from manufactures/ dealers. ➢ Use given guideline for commercial installation ➢ Collect various specifications of wiring material • Concept of commercial installation • Difference between residential and commercial installation • Difference between wires and cables • Types of cables required for commercial installations according to size and core • General requirements and selection factors for commercial installation • Load calculation and selection of size of service connection and nature of supply • Decide number of lighting and power sub circuits as per the IE rule • Decide size of wire/cable required for every sub circuit • Decide length of wire required for every sub circuit • Draw the single line diagram • Decide ratings of wiring accessories, main switch, bus bar MCB, ELCB etc. • Decide proper method of earthing for commercial installation • Prepare list of material for commercial installation with their costing • Draw the single line diagram • Find out the estimation chart with proper cost of material , cost of labour, contingencies charges and profit margin • Draw the circuit diagram	12	20
5. Electrification of Industrial Installation Specific Objectives ➢ Based on criteria for selection decide if the installation is industrial installation ➢ State difference between power wiring and actual industrial wiring ➢ Guideline for industrial installation ➢ Calculate detail estimate and costing of industrial installation • Concept of industrial load • Concept of motor wiring circuit and single line diagram • Guidelines about power wiring and motor wiring • Design considerations of electrical installation in small industry/factory/workshop • Machine current calculations • selection of size for wires , cables required for the machines and its controlling unit • Decide length and size of cable required for the every industrial load • Decide ratings of wiring accessories, main switch, bus bar MCB, ELCB etc. for every industrial load. • Decide proper method of earthing for industrial installation • Prepare list of material for industrial installation with their costing • Find out the estimation chart with proper cost of material , cost of labour,	12	24

contingencies charges and profit margin • Draw the circuit diagram		
6. Contracts, Tenders and Execution Specific Objectives ➢ Draft tender documents ➢ Fill tender documents following appropriate procedure and be present and act as per the requirements and rules while opening of the tender. ➢ Prepare billing • Concept of contract and tenders • Types of contracts and contractors • Types of tenders • Requirements of valid contract and good contractor • Tender notice • Procedure for submission and opening of tenders • Comparative statements for selection of contractors • Principles of execution of work • Billing of executed works.	04	12
Total	**48**	**100**

Tutorials:

1. Electrical installation scheme for small bungalow or house. Draw wiring diagram and prepare detailed estimation and costing.
2. Electrical installation scheme for commercial building/ floor mill. Draw wiring diagram and prepare detailed estimation and costing.
3. Electrical installation scheme for small industry/factory/workshop/agriculture pump . Draw single line diagram and prepare detailed estimation and costing. Draw the circuit diagram

Assignments:
Skills to be developed:

Intellectual Skills:

1. Identify and apply different designing methods as per the requirements
2. Select proper ratings
3. Ability to analyse and select appropriate methods for estimation and costing

Motor Skills:

1. Drawing skill.
2. Measuring dimensions

List of Assignments: Problems & sheets on following topics.

1) Electrical estimation & design of residential consumers (for flats/Bungalows/Row houses)
2) Electrical estimation & design of Commercial consumers (for Malls/Colleges/Hospitals, Banks)

3) Electrical estimation & design of Agricultural consumers (Pump jets/submersible pump)

4) Electrical estimation & design of small & medium Industrial consumers.

5) Electrical Installation & layout preparation of your college campus.

6) Preparation of a NIT (Notice Inviting Tender)

Note: Estimations be made for loads up to 100 KVA

Learning Resources:

1. **Books:**

Sr. No.	Name of the Author	Title of the book	Name of the Publisher
1	J.B.Gupta	Electrical Installation Estimating & costing	S.K.Kataria & sons New Delhi
2	Raina Bhattachraya	Estimating dsign & costing	New Age
3	Allasappan & Ekambarm	Estimating design & costing	Tata McGraw hill
4	S L Uppal	Estimating & costing	Khanna Publiser
5	Surjit Singh	Electrical Estimating & costing	Dhanpat Rai & co.

2. **ISO, IS, BS standards, Data Sheets, IE Rules Handbook**
   IS/International code: IS5909, 7733, 2174, 732, 4648

3. **Charts, Models, CDs, Transparencies,**

4. **Websites:**
   http://www.bestestimatepro.com/
   bieap.gov.in/estimatingandcosting.pdf
   http://indiacatalog.com/web_directory/electrical/electrical.html