

COURSE TITLE : ELECTRICAL ESTIMATING AND COSTING
COURSE CODE : 4033
COURSE CATEGORY : A
PERIODS/WEEK : 5
PERIODS/SEMESTER : 70
CREDITS : 5

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Wiring Accessories and Illumination Engineering	18
2	Estimation of Domestic Installation	18
3	Estimation of Industrial Installations	17
4	Estimation of Substations	17
Total		70

Course Outcome:

Sl.	Sub	On completion of this course the student will be able:
1	1	To understand various types of materials required for wiring.
	2	To understand different systems of illumination.
2	1	To comprehend the estimation of a domestic installation.
3	1	To know different systems of earthing.
	2	To comprehend the estimation of industrial installations.
4	1	To comprehend the estimation of substations.
	2	To comprehend the knowledge of IS codes

Specific Outcome:

MODULE I: Wiring Accessories and Illumination Engineering

- 1.1.1 To describe the specifications of various wiring accessories.
- 1.1.2 To differentiate various types of wires and cables.
- 1.1.3 To state the laws of illumination.
- 1.1.4 To define different terms related to illumination.
- 1.1.5 To identify various lighting schemes – Direct, indirect, semi direct and semi indirect.
- 1.1.6 To determine illumination levels required at various poles.
- 1.1.7 To define the terms used for design of lighting schemes:
 - i. Space to Height ratio.
 - ii. Depreciation Factor.
 - iii. Maintenance Factor.
 - iv. Utilization Factor.
- 1.1.8 To deduce different methods of lighting calculation watt per square meter method.
- 1.1.9 To compute number of lamps required to illuminate various types of rooms, halls etc.
- 1.1.10 To draw the lighting arrangements.
- 1.1.11 To comprehend the operation of gas filled lamps and halogen lamps.
- 1.1.12 To comprehend the operation of arc lamps and CFL.
- 1.1.13 To comprehend the operation of sodium vapour lamps.
- 1.1.14 To comprehend the operation of Mercury vapour lamp.
- 1.1.15 To comprehend the operation of neon lamp and fluorescent lamps.

MODULE II: Estimation of Domestic Installation

- 2.1.1 To comprehend various wiring system used in domestic wiring.
- 2.1.2 To comprehend the general IS codes regarding internal wiring.
- 2.1.3 To compute the conductor size and the procedure for determines the size.
- 2.1.4 To define the circuits and sub circuits.
- 2.1.5 To draw the layout of wiring.
- 2.1.6 To describe the preparation of the estimate and cost of materials used for internal wiring of different buildings in surface conduit system.
- 2.1.7 To describe the preparation of the estimate and cost of materials used for internal wiring of different buildings in concealed system.
- 2.1.8 To compute simple problems.

MODULE III: Estimation of Industrial Installations

- 3.1.1 To describe the purpose of earthing
- 3.1.2 To Know various types of earthing
- 3.1.3 To Know IE rules regarding earthing systems.

- 3.1.4 To prepare the estimate and cost of materials used for a standard pipe earthing
- 3.1.5 To prepare the estimate and cost of materials used for a standard and plate earthing.
- 3.1.6 To prepare the estimate of wiring materials and cost of wiring for single phase and 3 phase supplies.
 - i. Domestic pump set.
 - ii. Irrigation pump set etc.
- 3.1.7 To prepare the estimate and cost of materials for the control panel.
- 3.1.8 To prepare the estimate and cost of wiring small workshop with the given capacity of machines
- 3.1.9 To know the industrial bus-bar system
- 3.1.10 To prepare the estimate and cost of materials required for giving single phase service connection without extension of Overhead lines.
- 3.1.11 To prepare the estimate and cost of materials for 3 phase service connection from the existing lines.
- 3.1.12 To prepare the estimate and cost of materials used for service connection using underground cables.
 - i. Single phase.
 - ii. Three phase.

MODULE IV: Estimation of Substations

- 4.1.1 To prepare the estimate of various materials used for distribution lines.
- 4.1.2 To prepare the estimate and cost of materials for extending single phase OH distribution line
- 4.1.3 To prepare the estimate and cost of materials for extending 3 Phase OH distribution line
- 4.1.4 To explain how to prepare an estimate and cost of materials for street lighting using overhead Cables.
- 4.1.5 To explain how to prepare estimates and the cost of materials for street lighting using UG cables.
- 4.1.6 To prepare the estimate and the cost of materials for extending an existing 11 kV Overhead line
- 4.1.7 To Study various components of pole materials and substation and their costs
- 4.2.1 To study IS Codes.

CONTENTS

MODULE I

Wiring accessories- main switch-isolation and load break duty-classification of main switches-functional switches-one way-two way-intermediate switches-knife switches-specification of switches-function and specification of socket outlets, ceiling roses, fan regulators. Fuses-need-classification-specification. Neutral link.

Miniature circuit breaker-classification-function and specification-Residual current devices-classification-functions and specification.

Lamp holders-function-classification-specification. Wiring cables –classification-specification- colour codes.

Illumination- classification of electric lamps- working of Incandescent, halogen & arc lamps, Gas discharge lamps- sodium vapour lamps– neon-mercury vapour lamps-LED lamps. Inverse square law- Lambert's cosine law-different lighting schemes-illumination levels as per IS standards at various places- estimation of number of luminaries required for the illumination at specific places.

MODULE II

Relevant rules- mention IS 732-IS 3043-various wiring methods as per IS 732.- Relevant sections of CEA regulations 2010 regarding internal wiring.

Classification of Circuits-Light and Power circuits. Sub circuits- light sub circuit- power sub circuits. Capacity of sub circuits. Switch boards-Main switch board-sub switch board-Distribution board-Function –classification- specification.

Selection of cables for internal wiring-cable size calculation-simple problems. Selection criteria for control switches-main switch. Selection criteria for protective gears-RCCB-MCB-fuse. Co-ordination between fuses or MCBs at different circuit levels- size of earth continuity conductor and earthing conductor.

Preparation of schematic diagrams and wiring diagrams-Single line and multiline. Standard estimation format-mention use of estimation software. Estimation problems regarding Electrification of domestic buildings.

High rise building definition –relevant rules regarding electrification of high rise buildings.

MODULE III

Purpose of earthing-functional earthing-protective earthing- definition of earthing-components of earth resistance-Relevant rules –IS 3074.Various types of earthing-plate- rod-strip- sketches-formulae for electrode resistance-earthing conductor and earth continuity conductor-schematic arrangement of earthing and protective conductor.

Simple estimation problems regarding rod and plate earthing.

Installation of motor pump set-need of starter-Rating of back up fuse-rating of cables- rating of earthing conductor-for single phase and three phase pump sets. Estimation problem regarding domestic and irrigation pump sets. Control panel-components of control panel- control units-protection units-measuring instruments. Estimation problems.

Relevant rules regarding industrial electrification-size and rating of busbars-copper and aluminium bus bars-supporting insulator. Estimation problems in small workshops below 50kW connected load.

Service connection- definition-classification-use of weather proof cables -estimation problems for single phase and three phase over head service connections.

MODULE IV

Over head line construction- Relevant sections of CEA regulations 2010 regarding overhead line construction-materials-specifications –classification-AAC-AAAC-ACSR-Size and rating of line conductors-insulators-Pin-shackle-disc-supporting poles- stays-anchor stay-strut pole stay-earthing of line structures, estimation problems regarding the extension of single phase and three phase distribution lines with and without street light- estimation problems regarding the extension of 11kV lines.

Substation- definition-classification-11kV substation- pole mounted - plinth mounted-components-substation earthing-layout.

REFERENCES:

1. IS -732-1989
2. IS- 3043-1987
3. IS- 10118-1982
4. CEA Regulations 2010
5. Raina.K.B.& Bhattacharya. S.K. Electrical Design Estimating and Costing: New Age International.
6. J B Gupta. A Course in Electrical Installation, Estimating & Costing: S K Kataria & Sons.
7. Surjith Singh. Electrical estimating and costing: Danpat Rai &Co.