

# **AMEL26 DESIGN AND ESTIMATION OF ELECTRICAL SYSTEMS**

## **UNIT-1 ELEMENTS OF ESTIMATING**

- 1.1 Introduction ,Purpose of Estimating and Costing:, Qualities of a good Estimator, Essential Elements of Estimating and Costing, Tender,
- 1.2 Guidelines for Inviting Tenders, Quotation, Other Important Factors of Estimating and Costing, Brief Questions with Answers.

## **UNIT-2. CONVENTIONAL SYMBOLS**

- 2.1 Differential Types of Symbols.

## **UNIT-3 WIRES, WIRE JOINTS, TERMINATION AND WIRING TOOLS**

- 3.1 Wire and Cable, Choice of Conductor, Conductor Materials, Insulating Materials ,
- 3.2 Types of Wires used for Internal Wiring, Wire Splicing and Termination.

## **UNIT-4 TYPES OF HOUSE WIRING**

- 4.1 Cleat Wiring, Wooden Casing and Capping Wiring, PVC Casing and Capping Wiring, Tough Rubber Sheathed Wiring or Batton Wiring, Lead Sheathed or Metal Sheathed Wiring,
- 4.2 Conduit Wiring System, Conduit Accessories and Fitting, Advantages and Disadvantages of Conduit Wiring Systems.

## **UNIT-5 WIRING MATERIALS**

- 5.1 Domestic Wiring Accessories, Miniature Circuit Breaker, Residual Current Circuit Breaker or Earth Leakage Circuit Breaker,
- 5.2 Components used for Protection Against Earth Leakage Current, Characteristics, Working and Construction of ELCB or RCCB; Load Change, Over Switches

## **UNIT-6 TESTING OF INSTALLATION**

- 6.1 General, Insulation Resistance Test between Installation and Earth, Testing of Insulation Resistance Test between Conductors, Testing of Polarity of Single Pole Switches,
- 6.2 Earth Continuity, How to Measure Earth Resistance, Merger Earth Tester,
- 6.3 Voltmeter Method of Testing Earth.

## **UNIT-7 PROTECTION AGAINST OVERLOAD, SHORT CIRCUIT AND EARTH FAULTS**

- 7.1 General , Main Features of Good Protective Devices, Protective Relays,
- 7.2 Essential Fundamental Elements of Relay, Description of Relays, Buchholz Relay Protection,
- 7.3 Electromagnetic Attraction Type Relays, Induction Type over Current Relay,
- 7.4 Induction Type Reverse Power Relay, Moulded Case Circuit Breakers.

## **UNIT-8 EARTHING, ELECTRIC SHOCK, ELECTRIC FIRE, FIRE FIGHTING EQUIPEMENT**

- 8.1 Earthing, Purpose of Earthing, IS Specification Regarding Earthing of Electrical Installation, Definitions, Different Methods of Earthing, Brief Question- Answers,
- 8.2 Electric Shock Factors on which Intensity of Electric Shock Depends, Cure of Electric Shock, Brief Questions Answers, Electrical Fire-fighting, Firefighting Teams.

## **UNIT-9 DOMESTIC ELECTRICAL INSTALLATION AND ESTIMATES**

- 9.1 Definitions, Drawing , Definition and Measurements of Points and Wiring, Electric Sub-station and Wiring Installation, Electric Installation in Building ,
- 9.2 Control at Commencement of Supply, Types of SB's Capacity of Circuit Internal Wiring Estimates, Sequence to be followed in Carrying out the Estimates,
- 9.3 Definition and Positioning of Equipment, Arrangement of Apparatus, Locations of Various Outlets in House Wiring, Selection of Wires. Sub-circuits ,
- 9.4 Selection Rating and Installation of Necessity Equipment on the Main Switch Board.

## **UNIT-10 MOTOR (CONTACTOR) CONTROL CIRCUITS**

- 10.1 Definitions of Equipment's, Contactor Control Circuit Components, Contactor Control Circuits and Diagrams, Design Guidelines , Motor Control Circuits,
- 10.2 Sequence Starting of Motors Manually/ Automatically, Automatic Sequence Control of Two and Three Motors with Time Delay,
- 10.3 Motor Operated from Two Alternative Sources of Supplies, Starting of Two speed Squirrel Cage Induction Motor, Star Delta Starters.

## **UNIT-11 THREE PHASE FOUR WIRE DISTRIBUTION SYSTEM**

- 11.1 Transmission Systems from Sub- station, Comparison between D.C. and A.C. Supply System, Components of Distribution Overhead Line,
- 11.2 Determination of Size of Conductor for Overhead Transmission Line. Insulators, Various Types of Insulators, Methods of Tying,
- 11.3 Conductor with Insulator, Lightning Arrester, Earthing of Transmission, Stay Tightners,

## **UNIT-12 UNDERGROUND CABLES, INSTALLATION, ESTIMATES AND STREET LIGHTING**

- 12.1 Planning the Route for Cable Laying, Laying of Cable, Precautions of Excavation of Trenches, Procedures for Drawing in Cables,
- 12.2 Classification of Cables, Underground Cables for Street Lighting, Laying of Cables, Street Light Poles

### **Reference Books:**

1. Electrical Design Estimating and Costing (2018-19 Session) Paperback – 1 March 2017 by K. B. Raina (Author)
2. Electrical Design Estimating and Costing (Old Edition) Paperback – 1 January 1991 by K.B. Raina (Author)