Program : **Diploma in Electrical and Electronics Engineering**	
Course Code : **6032C**	Course Title: **Electrification of Residential Buildings**
Semester : **6**	Credits: **4**
Course Category: **Program Elective**	
Periods per week: **4 (L:3 T:1 P:0)**	Periods per semester: **60**

Course Objectives:

- To design internal wiring of residential buildings.
- To draw wiring and schematic diagrams.
- To recognize the importance of safety and protection devices.

Course Prerequisites:

Topic	Course code	Course name	Semester
Power and Energy		Fundamentals of Electrical & Electronics Engineering	2

Course Outcomes:

On completion of the course, the students will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Outline the specifications and uses of various components for electrification in residential buildings.	14	Understanding
CO2	Choose a suitable lighting scheme and calculate the number of lighting points in a residential building.	15	Applying
CO3	Identify the estimate for a suitable earthing as per IS standards.	15	Applying
CO4	Prepare schedule of materials and estimate for electrification in residential building.	14	Applying
	Series Test	2	

CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	2						
CO3	3						
CO4	3						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcome	Description	Duration (Hours)	Cognitive level
CO1	**Outline the specifications and uses of various components for electrification in residential buildings.**		
M1.01	Summarize the effects of electric shocks and its precautions.	3	Understanding
M1.02	Explain various systems of wiring and familiarize general rules and practices for wiring in India.	3	Understanding
M1.03	Summarize the specifications and uses of wiring materials and accessories.	4	Understanding
M1.04	Explain the criterion for selection of cables.	4	Understanding
Contents: Electrical safety - phenomenon of electric shock and its effects- precautions against shock - procedure to be taken when an accident due to electric shock occurs- important safety precautions. Electrical wiring systems - purpose - classification of wiring - conduit wiring - accessories - specifications - uses - wiring practices- general rules and practices for wiring in india. Essential components in electric wiring-basic idea - classification - specifications - uses - cables - main switches- circuit breakers (MCB, MCCB, RCCB, ELCB) - switches-socket outlets - ceiling roses - lamp holders - fuses - switch fuse unit - internal power distribution scheme - function - components - main distribution board(MDB) Criterion for selection of cables for internal wiring.			
CO2	**Choose a suitable lighting scheme and calculate the number of lighting points in a residential building**		
M2.01	Explain various terms of illumination and indicate illumination levels for various purposes.	5	Understanding
M2.02	Compare and classify various lamps used in residential lighting.	3	Understanding

M2.03	Illustrate different lighting schemes in residential lighting	2	Understanding
M2.04	Choose a suitable lighting scheme for residential building and calculate the number of lighting points	5	Applying
	Series Test - I	1	

Contents:

Illumination - define terms used in illumination - luminous flux-illumination- luminous efficiency - coefficient of utilization - laws of illumination - illumination level for various purposes (as per standards)

Electric lamps - classification - luminous efficiency of various lamps - lifespan - applications-comparison of LED, fluorescent tube and incandescent lamps based on lumen per watt, life span and colour rendering index.

Lighting systems - classification - basic concept and diagrammatic representation - direct - semi direct - diffused - indirect - comparison of Direct and indirect lighting.

Design of lighting schemes for residential buildings - watts per square metre method-calculation of number of lamps required-problems.

CO3	**Identify the estimate for a suitable earthing as per IS standards**		
M3.01	Draw symbols for various devices and accessories used in wiring as per Indian standard.	2	Understanding
M3.02	Choose number of sub circuits in a residential building	4	Applying
M3.03	Summarize the procedure for earthing in residential building	3	Understanding
M3.04	Prepare the estimate for a standard pipe and plate earthing	6	Applying

Contents:

Standard symbols of various devices and accessories used in wiring as per Indian standard.

Colouring scheme - for conductors - labelling methodology.

Design of sub circuits - calculation - connected load-number of sub circuits-cable size-rating of protective and controlling devices-problems.

Earthing - purpose – classification (listing only) - standard sizes for earth continuity conductor - electrode and earthing lead-installation procedure.

Estimation of earthing - preparation of estimate for a standard pipe and plate earthing as per IS standards.

CO4	**Prepare schedule of materials and estimate for electrification in residential building.**		
M4.01	Explain the standard format and factors for preparing estimates.	2	Understanding
M4.02	Interpret various standards of certification of products	2	Understanding

M4.03	Illustrate star labelling of various domestic appliances	2	Understanding
M4.04	Prepare estimation of materials for electrification in residential building	8	Applying
	Series Test - II	1	

Contents:

Introduction to estimation – definition - standard format-factors for estimation - location - cost of items - tax rate - contingency expenses - labour cost - validity period.

Certification of products - national and international certifications - BIS - IEC - CE - UL.

Star Labelling - Need and its benefits - star ratings - list of appliances/equipment covered under Standards & Labelling program.

Estimation of residential building - electrification of residential buildings - preparation of layout, wiring diagram and estimates - problems.

Text /Reference:

T/R	BookTitle/Author
T1	Electrical Design Estimating and Costing - Raina, K.B.; Dr. S. K. Bhattacharya, New Age International (p) limited.
T2	Electrical Estimating and Costing - Allagappan,, N. S. Ekambarram, Tata Mc-Graw Hill Publishing Co. Ltd.
T3	Electrical Wiring,Estimating and Costing. Dr.S.L.Uppal, New age international (p) limited.
T4	Electrical Estimating and Costing _Singh, Surjit Ravi Deep Singh, DhanpatRai and Sons.
T5	A Course in Electrical Installation Estimating and Costing- Gupta, J.B. S.K. Katariaand Sons Edition.
R4	Bureau of Indian Standard. SP-30:2011, National Electrical Code 2011.
R5	Bureau of Indian Standard. IS: 732-1989, Code of Practice for Electrical Wiring Installation.

Online resources:

Sl.No	Website Link
1	https://bis.gov.in/index.php/standards/technical-department/electrotechnical/
2	http://www.cpwd.gov.in/Publication/Internal2013.pdf
3	https://cpwdpims.nic.in/display_cpwd/technical_ltr/kmscategory.aspx
4	http://www.ceikerala.gov.in/
5	http://www.kseb.in/index.php?lang=en