GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Electrical Engineering		
Semester	IV	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025
Course code	1EE4104	Course Name	Electrical Wiring, Estimating, Costing and Contracting

I. TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1EE4104	Electrical Wiring,Estimating,Costing and Contracting	4	0	1	4	4	0	2	2	8	40	60	100	30	20	50	20	170

Abbreviation:	**CL-** Classroom Learning	**TL -** Tutorial Learning	**LL -** Laboratory Learning
	SLH - Self Learning Hours	**SLA -** Self Learning Assessment	**SA -** Summative Assessment
	CE – Continuous Evaluation		**SEE –** Semester End Examination

II. PRE-REQUISITES

Basic knowledge of electrical safety equipment and wiring tools.

III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES

The purpose of this course is to help the student to learn about the various types of electrical wiring with safety equipment installation and able to make estimation and cost of electrical wiring done in Residence, Industry. Similarly, student learn about Tender and terms related to it.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

- CO1- Perform different types of electrical wiring and cabling activities.
- CO2- Prepare generic tender document, quotation, comparative statement, and supply order.
- CO3- Prepare detail estimate and costing of Residential and Industrial Electrical installations following IE Act-2003.
- CO4- Prepare estimate of commercial and public lighting installations.
- CO5- Prepare estimate of overhead and underground distribution lines.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit-1 Electrical Wiring and IE Rules	**TLO 1.1** Explain with justification the criteria for selecting wire/cable and other electrical components for the given type of installation. **TLO 1.2** Describe with sketches the installation of wiring systems for the given type of occupancy. **TLO 1.3** Describe with sketches the wiring type as per the functional requirements of the given type of occupancy. **TLO 1.4** Explain the process of installing the given type of cable(s). **TLO 1.5** Describe the use of the given tools in the given electrical engineering situation.	**1.1** Types of wires and cables, components and accessories of electrical wiring systems. **1.2** Electrical Wiring systems (PVC casing-capping, conduit and concealed), panel wiring **1.3** Electrical Wiring types (one lamp control, staircase and godown, corridor etc.) **1.4** Applications of Tools used in wiring: Pliers, nose pliers, cutter, screw driver, tester, test lamp, crimping tool, continuity tester, outside micrometre, knife. **1.5** Components with specifications used in wiring systems: different types of switches (single and double pole), plugs, sockets, DBs, MCBs,	**12**	**12**

	TLO 1.6 Describe the functions/applications of the given components of wiring. **TLO 1.7** State safety rules/ standards applicable for the given electrical systems. **TLO 1.8** Describe the testing procedure for the given earthing systems.	MCCBs, RCCBs, holders, wires, cables. (No working only ratings needs to be explained for all these components) **1.6** Safety rules/standards applicable as per Indian Standards (IE Act. - 2003) **1.7** Different tests carry out for insulation and earth resistance measurement.		
Unit-2 **Elements of Estimating, Costing and Contracting**	**TLO 2.1** State the purpose of preparation of the given type(s) of estimates. **TLO 2.2** State the purpose of awarding the given type(s) of contracts. **TLO 2.3** Prepare tender documents, quotations and bills for the specified work. **TLO 2.4** Understand the Security Deposit and Earnest Money Deposit.	**2.1** Estimating and costing: Purpose, Qualities of good estimator, essential elements of estimating and costing, **2.2** Meaning and purpose of- rough estimate, detailed estimate, supplementary estimate, annual maintenance estimate and revised estimate, Factors to be considered while preparation of detailed estimate and economical execution of work. **2.3** Contracts: Concepts, types, roles, and qualities of good contractor **2.4** Tender and Quotation: Types of tenders, tender notice, preparation of tender document, and method of opening of tender, Government e-Market Place (GeM), features and benefits of GeM, Quotation, quotation format, comparison between tender and quotation, Comparative statement, format of comparative statement. Order format, placing of purchasing order, purchase procedure and function, Principles of execution of works, planning, organizing and completion of work, Billing of work. **2.5** Understand the difference between Security Deposit and Earnest Money Deposit.	**14**	**12**
Unit-3 **Domestic and Industrial Wiring**	**TLO 3.1** Interpret the given electrical installation plan and electrical diagrams. **TLO 3.2** Estimate materials required for the given domestic installations. **TLO 3.3** Draw an installation plan, wiring diagrams and single line diagrams for the given industrial installations. **TLO 3.4** Carry out estimation for the given industrial	**3.1** Electrical Drawing: Electrical symbols used in electrical diagrams as per NEC 2023, multiline and single line representation of conductors, Electrical diagrams, their classification. Interpretation of electrical installation plan and electrical diagrams. **3.2** Design of Domestic Installations: Steps to be followed for design and estimation of domestic installations. Design, drawing, estimation, and	**14**	**14**

	installations.	costing of a domestic installation having maximum 5 kW load. **3.3** Wiring diagram and single line diagram for single phase and three phase motors. Installation plan. **3.4** Design Considerations: Calculation of Motor current, deciding the cable size, deciding the size of Conduit, deciding the fuse rating, deciding distribution board and main switch/MCB, deciding the starter for Motors. **3.5** Design electrical installation scheme and preparation of estimate of agricultural pump, flourmill and small industrial unit having total aggregate three -phase load less than 30 kW.		
Unit-4 Multi-storied Commercial and Public Building Wiring	**TLO 4.1** Describe general rules of wiring of multi-storied building. **TLO 4.2** Calculation of total load for distribution work for given case study. **TLO 4.3** Calculate the size of busbar, cables, panels etc. **TLO 4.4** Requirement of approval of electrical inspection for high rise building. **TLO 4.5** Maintain smoke detection & fire alarm system **TLO 4.6** Maintain diesel generator set as a standby unit. **TLO 4.7** Maintain lifts, escalators, air conditioner load.	**4.1** Requirement of general rules of wiring of multi-storied building. **4.2** Calculation of total load floor wise with required material and accessories. **4.3** Distribution panels and bus bar system. **4.4** Importance of approval of electrical inspection for high rise building. **4.5** arrangement of smoke detection & fire alarm system in multi-storied building.	**12**	**14**
Unit-5 Estimation of Distribution System	**TLO 5.1** Service Connection: Underground and overhead, it's diagram and description. Calculation of material required for underground and overhead service connection. **TLO 5.2** Explain IE rules related to distribution system. **TLO 5.3** Estimate material required O.H distribution project work. **TLO 5.4** Estimate material required U.G distribution project work. **TLO 5.5** Determine main component of O.H and U.G distribution system.	**5.1** Types of service connection for O.H and U.G system **5.2** Calculation of load and estimate the required material for underground and overhead service connection. **5.3** Describe IE rules for different types of distribution system. **5.4** Case study for given O.H distribution project work. **5.5** Case study for given U.G distribution project work. **5.6** List of components for 3-phase O.H distribution system. **5.7** List of components for 3-phase U.G distribution system.	**08**	**08**

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO1.1 Use different types of electrical/electronic tools.	Use of different types of electrical/electronic tools.	**CO1**
2	LLO 2.1 Carry out staircase wiring and test the working of staircase wiring.	Preparation of staircase wiring and its testing.	**CO1**
3	LLO 3.1 Carry out godown wiring and test the working of godown wiring.	Preparation of godown wiring and its testing.	**CO1**
4	LLO 4.1 Carry out wiring to control lamp from different places.	One lamp control from three and/or four different places.	**CO1**
5	LLO 5.1 Prepare series lamp test board with 2 m wire extension.	Preparation of series lamp test board with 2m wire extension.	**CO1**
6	LLO 6.1Test the working of single pole one way and two-way switches and MCB.	Testing of single pole one way, two way switches and MCB using relevant tools and instruments.	**CO1**
7	LLO 7.1 Test of SPN Distribution Board Wiring on board.	Prepare SPN Distribution Board Wiring on board.	**CO1**
8	LLO 8.1 Carry out the polarity test of the electrical installation of machine laboratory.	Electrical installation testing.	**CO1**
9	LLO 9.1 Carry out PVC casing-capping and conduit wiring.	Preparation of PVC casing-capping, conduit wiring for minimum four points of 3m length.	**CO1**
10	LLO 10.1 Measure insulation resistance of electrical installation using insulation tester	Insulation resistance test on electrical installation.	**CO1**
11	LLO 11.1 Prepare a quotation from the given enquiry.	Preparation of a quotation.	**CO2**
12	LLO 12.1 Prepare tender document for purchase of electrical machines costing more than five lakhs.	Preparation of the tender document.	**CO2**
13	LLO 13.1 Calculate total load and carry out estimation for given domestic installation.	Design an electrical installation system for one BHK domestic unit and carry out an estimation.	**CO3**
14	LLO 14.1 Calculate total load and carry out estimation for given industrial installation.	Design an electrical installation system for small industrial installation and carry out an estimation.	**CO3**
15	LLO 15.1 Calculate load of Lift, Escalators and Air conditioners.	Calculation of Lift, Escalator and Air conditioner loads for high rise commercial /public building.	**CO4**
16	LLO 16.1 Draw layout diagram and carry out the estimation for low-tension (LT) line from given data.	Design an electrical installation system for a low-tension (LT) distribution line (415 volts) and carry out an estimation.	**CO5**
17	LLO 17.1 Draw layout diagram and carry out the estimation for high-tension (HT) line from given data.	Design an electrical installation system for a high-tension (HT) distribution line (11 kV) and carry out an estimation.	**CO5**

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Draw symbols related to electrical accessories and wiring.
- Draw and identify the wiring diagram of electrical panel.
- Visit to a nearby construction site and observe the electrification work being carried out and note details of wires, switchgears, earthing practices, safety aspects being followed etc.
- Collect industrial installation plan and prepare estimation for the same using suitable software.

Mini projects

- Carry out market survey of electrical materials for comparison of quality and cost.
- Collect existing installation plan of distribution lines and prepare an estimation for the same.
- Collect any tender document related to electrical installation and fill all related documents.
- Collect the information about distribution substation earthing and submit report on it.

● Collect the information about methods of wiring and submit report on it.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD	
1	Various fuse mounting units, fuse wire of different rating, ammeter, lamp bank.
2	Wooden/PVC board, single pole switches, double pole switches, sockets, MCB, red colour indicator, Rewirable Kitkat fuse, fuse wire.
3	PVC casing capping-3-meter, PVC conduit -3 meter, wires, wooden/PVC board, switches and sockets.
4	Pliers, screw driver set, nose pliers, measuring tape, cutter cum insulation remover, screw driver, tester, test lamp, crimping tool, lugs, continuity tester, knife, soldering gun.
5	Electric tester, test lamp, meggar, multimeter, rewirable KitKat fuse, fuse wire, safety hand gloves, safety boots, safety goggles, safety rubber mats, safety helmet (All ISI Mark)
6	Insulation tester 500V or 1000V

IX. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	Electrical Engineering Drawing	Bhattacharya S. K.	New Age International, New Delhi, ISBN: 978-81-224-0855-3.
2	Electrical Workshop: Safety, commissioning, maintenance and testing of electrical equipment	Singh R.P.	I.K. International Publishing House Pvt. Ltd. New Delhi, ISBN:978-9389447057
3	Electrical Wiring, Estimating and Costing	Uppal S.L; Garg G.C.	Khanna Publishers, New Delhi, ISBN-13: 978-81-7409-240-3.
4	A Course in Electrical Installation Estimating and Costing	Gupta J. B.	S.K. Kataria and Sons; New Delhi Reprint Edition, 2013, ISBN: 13: 978-9350142790
5	Electrical Design Estimating and Costing	K.B. Raina, S.K. Bhattacharya	New Age International Publisher, First, Reprint 2010, ISBN:13: 978-8122443585

X. LINK OF LEARNING WEB RESOURCE	
1	https://nsc.org.in/
2	https://www.esfi.org/
3	https://www.electricaltechnology.org/2013/09/electrical-wiring.html
4	https://www.electrical4u.com/types-of-electrical-insulator-overhead-insulator/
5	https://standardsbis.bsbedge.com/
6	https://standardsbis.bsbedge.com/

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Electrical Wiring and IE Rules	CO1	12	2	4	6	12
2	Elements of Estimating and Concept of Contracting	CO2	12	6	4	4	14
3	Domestic and Industrial Wiring	CO3	14	4	4	6	14
4	Multi-storied Commercial and Public Building Wiring	CO4	14	2	2	8	12
5	Estimation of Distribution Systems.	CO5	08	2	2	4	08
Grand Total			60	**16**	**16**	**28**	60

XII. COs AND POs AND PSOs MAPPING										
Course outcome (Cos)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	3	1	2	1	3	2
CO2	2	1	3	1	3	1	0	3	2	1
CO3	3	2	1	3	2	3	1	2	3	1
CO4	1	2	1	3	1	0	2	2	1	3
CO5	3	2	1	3	3	1	2	1	2	3
Legends: - *3- High* *2-Moderate/Medium* *1-Slight/Low* *0-None*										