GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: WIRING ESTIMATING, COSTING & CONTRACTING
(COURSE CODE: 3350901)

Diploma Programme in which this course is offered	Semester in which offered
Electrical Engineering	5th Semester

1. RATIONALE

Estimation of material and cost of electrical installation project important is very important aspect for an electrical engineer. The subject is designed so as to clear concepts of estimation and purchase procedure. Essential theoretical and practical knowledge will be achieved by this course.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Reads drawing of electrical installation and calculates quantity of material required for various electric installation and power projects
- Writes specifications and selection of the material required for various electric projects.
- Checks bills of contractor (s) for payment by referring schedule of rates prescribed by electricity authorities.
- Verifies rates for various items of works.
- Works in Design and planning.

3. COURSE OUTCOMES

- Interpret technical drawing/plan of project.
- Calculate quantity and cost f material.
- Estimate Electrical Project cost in scientific way.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	0	2	5	70	30	20	30	150

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit ESE - End Semester Examination; PA - Progressive Assessment.

5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I. Electrical Wiring	1.a Differentiate between different types of wiring system. 1.b Use different types wiring tools 1.c Prepare and operate different types of wiring circuits.	1.1 Different types of wires, wiring system and wiring methods. 1.2 Comparison of different types of wiring. 1.3 Specifications of Different types of wiring materials, Accessories 1.4 Different types of wiring tools. 1.5 Domestic and industrial panel wiring. 1.6 Different types of wiring circuits. 1.7 I.E. rules for wiring, Electricity supply act-1948.
Unit– II Elements of Estimating and concepts of contracting.	2.a Classify types of estimation and estimation tools 2.b Describe Purchase procedure	2.1 Introduction to estimation & estimation tools. 2.2 Electrical Schedule of rates, catalogues, Survey and source selection, Recording estimates 2.3 Determination of required quantity of material, Labor conditions, 2.4 Determination of cost material and labour, Contingencies, Overhead charges, Profit, 2.5 Purchase system, Purchase enquiry and selection of appropriate purchase mode, 2.6 Comparative

		statement, Purchase orders, Payment of bills 2.7 Terms, conditions, and types of contract system. Tendering procedure and preparation of simple tender. 2.8 Procedure for inviting and scrutinizing tender, Importance of Earnest Money Deposit, Security Deposit and S.O.R. 2.9 Indian Electricity Act and major applicable I.E rules
Unit– III Estimating and Costing of Domestic and Industrial Wiring	3.a Prepare Layout and wiring diagram for domestic and industrial wiring. 3.b Calculate quantity and cost of material required. 3.c Estimate the overall cost of domestic and industrial wiring work.	3.1 Principles of circuit design in lighting and power circuits, 3.2 Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram, 3.3 Selection of type of wiring and rating of wires and cables, 3.4 Load calculations and selection of size of conductor, Selection of rating of main switch, distribution board, protective switchgear ELCB and MCB and wiring accessories,Earthi

		ng of residential Installation, 3.5 Sequence to be followed for preparing estimate 3.6 Preparation of detailed estimates and costing of residential installation 3.7 Important considerations regarding motor installation wiring 3.8 Determination of input power, input current to motors, rating of cables, rating of fuse, size of Conduit, size of distribution Board, main switch and starter. 3.9 Preparation of detailed estimates and costing industrial installation 3.10 I.E. rules observed for above wiring
Unit–IV Estimating and Costing of Service Connection (Domestic and Industrial)	4.a Prepare Layout and wiring diagram for domestic and industrial wiring. 4.b Calculate quantity and cost of material required. 4.c Estimate the overall cost of domestic and industrial wiring work.	4.1 Concept of service connection, Types of service connection and their features, 4.2 Method of installation of service connection(1-phase and 3-phase), 4.3 Lay out/ wiring diagram of service connection 4.4 list of materials and accessories

		along with specifications required for 4.5 given installation work. 4.6 Estimation of service connection for domestic and industrial 4.7 (1-phase and 3-phase) service connections. 4.8 I.E. rules pertaining to above wiring.
Unit-V Estimation of Transmission line	5.a Determine parameters and specification of transmission line. 5.b Prepare plan of project work. 5.c Draw layout and transmission line. 5.d Estimate quantity of material required.	5.1 Main components of overhead lines, Line supports, 5.2 Factors governing height of pole, Conductor materials, 5.3 Determination of size of conductor for overhead 5.4 Transmission line, Cross arms, Pole brackets and clamps, Guys and Stays, Conductors configuration spacing and clearances, Span lengths, Overhead line insulators, Insulator materials Lightning Arrestors, Points to be considered at the time of erection of overhead lines, Erection of supports, Setting of stays, 5.5 Earthing of lines, Guarding of overhead lines,

		Clearances of conductor from ground, Spacing between supports conductors, 5.6 important specifications and sketches 5.7 List of materials and accessories required for the given project 5.8 estimate for material required. 5.9 I.E. rules pertaining to above project
Unit-VI Estimation of Overhead and Underground Distribution System.	6.a Survey overhead and underground distribution system installation. 6.b Prepare plan of project work. 6.c Draw layout and sketches of overhead and underground service connection. 6.d Estimate quantity of material required.	6.1 Survey work for estimation of overhead and underground distribution system. 6.2 Planning and layout of project. 6.3 List of materials and accessories required for the given project. 6.4 Procedure for preparing estimate for 440 V, 3-phase, 4 wire or 3 wire overhead and underground distribution system. 6.5 Necessary drawing/ sketches of overhead and underground system. 6.6 I.E. rules pertaining to above project.
Unit-VII Estimating and Costing of Repairs and	7.a Survey market for cost of product or parts. 7.b Prepare drawing of product 7.c Prepare cost table for product or repair and maintenance.	7.1 Market survey for cost of given product like D.O.L. starter,

Maintenance of Electrical Devices and Equipment		small motor, 7.2 mono block pump, automatic electric iron, table/ceiling fan, ICDP/ICTP 7.3 Switch, etc. 7.4 Preparation of detailed drawing work of the product. 7.5 Preparation of material quantity sheet for the product. 7.6 Find out overall cost of product 7.7 Location of fault. 7.8 Materials required and their cost for remedial measure of fault. 7.9 Estimation of repairing cost and overall cost. 7.10 Tools used for repairs & maintenance work 7.11 Preparation of cost schedule for repair and maintenance of electric fan, automatic electric iron, single phase transformer, mixer grinder, D.O.L. Starter,

Laboratory Experiences:

S. No.	Unit No.	Practical/Exercises (outcomes in psychomotor domain)	Approx. Hrs. Required
1	I	Carryout following wirings a. Tube light wiring b. Stair case wiring c. Go down wiring	4

S. No.	Unit No.	Practical/Exercises (outcomes in psychomotor domain)	Approx. Hrs. Required
		d. Parallel loop wiring	
2	I	Select appropriate wiring and list materials and accessories for given project	2
3	2	Prepare a tender notice for given project work	2
4	3	Estimating and costing of a domestic installation cost (Residential building, laboratory room or Drawing hall etc).	4
5	3	Estimating and costing of industrial installation. (work shop, agriculture, flour mill etc)	4
6	4	Estimating and costing of overhead service connection. (single phase and three phase).	4
7	4	Estimating and costing of underground service connection (single phase and three phase).	4
8	5	Estimation of material required for 220kv/110kv Transmission line.	4
9	6	Estimation of material required for overhead, 440 V, 3-phase ,4 wire or 3 wire distribution line.	4
10	7	Estimating and costing of any one Electrical Product	4
11	7	Estimating and costing of repairs and maintenance of any one domestic appliance	4
Total Hours (perform any practical worth 28 hours from above depending upon the availability of resources so that most units are covered)			40

6. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities such as:

i. Assignments for solving numerical
ii. Reads drawing of electrical installation and calculates quantity of material required for various electric installation and power projects
iii. Writes specifications and selection of the material required for various electric projects.
iv. Checks bills of contractor (s) for payment by referring schedule of rates drescribed by electricity authorities.
v. Survey and collect rates for various items of works.
vi. Gather Electrical work tender notices from news paper and read and interpret it.

7. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Industrial visit

8. SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book	Author	Publication
1.	Electrical Design, estimating & Costing	K. B. Raina & S.K. Bhattacharya,	New Age International (p) Limited, New Delhi
2.	Electrical Estimating & costing	Dr. S L Uppal	
3.	Electrical Installation Estimating & Costing	J.B. Gupta	S. K. Kataria & Sons
4.	Relevant IS Code for-service line connection, laying of cable, wiring installation	NBC	National Building Code- Vol. IV
5.	I.E. rules for wiring, Electricity supply act-1948.	IS Code	Electricity supply act-1948.

B) List of Major Equipment/ Instrument/Tools/material

i. Different wiring Tools and wiring material.
ii. DOL starter, star delta starter, auto transformer starter.
iii. Mono block pump, automatic electric iron, table/ceiling fan, ICDP/ICTP, automatic electric iron, single phase transformer, mixer grinder

C) List of Software/Learning Websites

i. www.nptel.iitm.ac.in
ii. www.vlab.com

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. V.R.Kotdawala** Lecturer in Electrical Engineering G.P,Himatnagar
- Prof. A. A. AMIN, Lecturer in Electrical Engineering,Govt.Poly,Vadnagar.

Coordinator and Faculty Members from NITTTR Bhopal