

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: ELECTRICAL ESTIMATION AND COSTING	Course Code : 15EE54T
Semester : V	Course Group : Core
Teaching Scheme (L:T:P) : 4:0:0 (in Hours)	Credits : 4 Credits
Type of course : Lecture +Assignments	Total Contact Hours : 52
CIE : 25 Marks	SEE : 100 Marks
Programme: Diploma in Electrical and Electronics Engineering.	

Pre-requisites : Knowledge about Elements of Electrical Engineering , Engineering Drawing, Electrical Wiring and Professional Ethics.

Course Objectives : To enable the students to prepare the schedule of materials with specifications and estimates for different types of electrical installations.

COURSE TOPICS:

Unit No	Unit Name	Hours
1	Introduction	05
2	Service Mains	10
3	Lighting Installations	12
4	Power Installations	08
5	Distribution lines and Transformer centre	10
6	Transmission lines and substations	07
	Total	52

Course Outcomes:

On successful completion of the course, the student will be able to:

1. Summarize the importance of estimation, specification and earthing.
2. Prepare the schedule of materials with specifications and estimates for service mains.
3. Draw the wiring plan for residential buildings, Prepare the schedule of materials with specifications and estimates for lighting Installations.
4. Draw the layout of machines with wiring plan for workshops. Prepare the schedule of materials with specifications and estimates for power insulation.
5. Prepare the schedule of materials with specifications for Distribution lines and estimates for transformer centre.
6. Prepare the schedule of materials with specifications for transmission lines and substations.

Composition of Educational Components

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks
1	Remembering	30	30
2	Understanding	30	30
3	Application/ Analysis/Create	40	40
Total		100	100

Course Outcome linkage to Cognitive Level

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	<i>Summarize the importance of estimation, specification and earthing</i>	<i>R/U</i>	2,5,10	5
CO2	<i>Prepare the schedule of materials with specifications and estimates for service mains.</i>	<i>R/U/A</i>	2,10	10
CO3	<i>Draw the wiring plan for residential buildings, Prepare the schedule of materials with specifications and estimates for lighting Installations.</i>	<i>R/U/A</i>	2,10	12
CO4	<i>Draw the layout of machines and wiring plan for workshops. Prepare the schedule of materials with specifications for power insulation.</i>	<i>R/U/A</i>	2,10	8
CO5	<i>Prepare the schedule of materials with specifications for Distribution lines and estimates for transformer centre.</i>	<i>R/U/A</i>	2,10	10
CO6	<i>Prepare the schedule of materials with specifications for transmission lines and substations.</i>	<i>R/U/A</i>	2,10	7
			Total sessions	52

Course Content and Blue Print of Marks for SEE:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set as per weightage allotted for each chapter			Marks weightage (%)
				R	U	A	
1	Introduction.	05	10	0.5	0.5		10
2	Service Mains	10	20	0.5	0.5	1	20
3	Lighting Installations	12	25	0.5	0.5	1.5	25
4	Power Installations	08	15	0.5	0.5	0.5	15
5	Distribution lines and Transformer centre	10	20	0.5	0.5	1	20
6	Transmission lines and substations	07	10	0.5	0.5		10
	Total	52	145	6 (100Marks)			100

Note: In the question paper pattern in SEE, Internal choice should be given from units 5 and 6

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
ELECTRICAL ESTIMATION AND COSTING	-0	3	-0	0-	1	0	0	0	0	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Content:

UNIT I INTRODUCTION

05 HRS

Meaning of estimation, purpose of estimating and the factors to be considered while preparing estimations, qualities of a good estimator, Meaning of specification, importance of specification and the factors to be considered. Meaning of standardization and its advantages. Meaning of overhead charges, stock incidental charges, contingencies, supervision charges, labour charges, Inspection/Inspectorate charges, transportation charges and miscellaneous charges. Meaning of tender/tender notice, quotation, comparative statement, purchase order and work order. Importance / purpose of IE Act and IE Rules.

Meaning of earthing, touch potential and step potential, necessity of earthing, Points to be earthed, factors influencing earth resistance, methods of reducing earth resistance, standard values of earth resistance for various installations, method of selecting the size of earth conductor, types /methods of earthing, Pipe earthing-diagram, specifications of pipe earthing, Plate earthing-diagram and specifications of plate earthing.

UNIT II SERVICE MAINS

05 HRS

Meaning of service mains, code of Practice for service mains, types of service mains- Over Head Service Mains -materials and specifications, UG Service Mains -materials and specifications, Standard wire size table, current ratings for Aluminium, copper conductors and selection of size of conduit pipe as per the size and number of wires.

Load calculation, selection of size and type of conductor/UG cable, discrimination of size of protective devices, Quantity calculation, schedules of materials and estimates for single phase OH service connection, three phase OH service connection, single phase UG service connection and three phase UG service connection.

UNIT III LIGHTING INSTALLATIONS

12 HRS.

Interior Wiring types and their applications, factors to be considered while selecting the type of wiring system, materials required for Interior wiring and their specifications, Code of Practice for Lighting Installations, method of deciding the number of sub-circuits, calculating the quantity of wiring materials and accessories for the Interior Wiring, load calculations for a residential buildings, size of conductors, main switch, sub switches and protective devices. Draw wiring plan for AEH Installation, concept of horizontal run, vertical rise and vertical drop. Prepare the schedule of materials for providing lighting and heating circuits and their estimates. Procedure for converting lighting to AEH installation.

UNIT IV POWER INSTALLATIONS

08 HRS

Code of Practice for Power Installations, materials required for power circuit wiring and their specifications, Prepare the layout diagram of machines showing clearances as per IS standards, draw wiring plan of the Power circuit for workshops, Decide the type of wiring

system, load calculations, determine the size of conductors, main switch, Isolators, sub switches and protective devices, Draw the SLD of Power Distribution Scheme showing grading/discrimination of ratings of protective devices, Prepare the schedule of materials with specifications for workshops and their estimates, Determine the rating of motor for IP set and the concept (**only**) of pump house wiring.

UNIT V

DISTRIBUTION LINES AND TRANSFORMER CENTRE 10 HOURS

Code of practice for Distribution Lines and Transformer centre, types of transformer centres - Pole mounted, plinth mounted, indoor and outdoor types. Determining the rating of Distribution Transformer. Write Specifications of the Distribution Transformer. Draw the SLD of a Transformer centre indicating the size of protective devices, Prepare the schedule of equipments /Materials with specifications for a 11KV/415V,100 KVA transformer centre and their estimates, 415 V LT line materials and specifications , method of calculating various LT line materials (**only**). Prepare the schedule of materials (**only**) for 3 phase 4 wire LT line, 11 KV HT Line-materials and their specifications, method of calculating various HT line materials and tapping structure, TOPO sheet and its use, Concept of combined estimates. Prepare the schedule of materials (**only**) for 11 KV single circuit HT line for Rural Electrification.

(Note: HT lines over head type only)

UNIT VI

TRANSMISSION LINES AND SUBSTATIONS 07 HRS

Code of practice for Transmission lines and substations, transmission line materials and their specifications, types of Towers, ACSR conductors and Number of Disc insulators in suspension string, strain string, span and height of towers for 66 KV, 110 KV, 220 KV transmission lines, concept of single circuit and double circuit transmission lines, method of calculating the Quantity of transmission line materials, Prepare the schedule of materials (**only**) for 66 KV,110 KV and 220 KV single circuit transmission lines. 66KV/11KV, 5 MVA Substations- Single Line diagram, list of Electrical equipments/ materials (**only**) and their specifications.

Reference Books:

Sl No.	Title of the book	Author	Publisher
01	Electrical Design Estimating and Costing.	K.B.Raina&K.Battacharya.	Khanna Publications.
02	Electrical Installation Estimating and Costing.	J.B.Gupta	S.K.Kataria and Sons
03	Electrical Wiring, Estimating and Costing.	Dr.S.L.Uppal	New age international (p) limited
04	Electrical Estimating and costing.	Surjit Singh	DhanpatRai company.
05	Electrical Estimating and Costing.	N.Alagappan and Ekambaram	Tata McGraw Hill
06	Electrical wiring, Estimating and costing	B.D.Arora	R.B. Publication.
07	Electrical Estimating Specification and Costing	M. RaghunathRao	Eastern Book Promoters Belgaum (EBPB)

e-Resources:

1. <http://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html>
2. <file:///C:/Users/Dell/Downloads/guidelines%20for%20electrical%20wiring%20in%20residential%20buildings%20.pdf>
3. <http://www.cpwd.gov.in/Publication/Internal2013.pdf>
4. <http://bescom.org/wp-content/uploads/2013/01/PDFFILE1.pdf>
5. http://mptransco.nic.in/tender_files/volume-v.pdf (Transmission Line Materials and Installation work.)
6. https://www.ergon.com.au/__data/assets/pdf_file/0004/146839/NI000401R121-Subs-Design-Manual.pdf

Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and student activities, assignments.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three IA tests for Theory: (Average marks of Three Tests to be computed).	20	Blue Books	1 to 6
		Student Activity		Student Activity	05	Report of 2 pages	1 to 6
		TOTAL		25			
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 6
	End Of Course Survey			End Of The Course	Questionnaires		1 to 6

*CIE – Continuous Internal Evaluation *SEE – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Note to IA verifier: *The following documents to be verified by CIE verifier at the end of semester*

1. Blue books (20 marks)
2. Student suggested activities report for 5 marks evaluated through appropriate rubrics.
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

Course Contents with Lecture Schedule:

	Contents	Duration
Unit I	INTRODUCTION	05 Hours
1.	Define estimation, explain the purpose of estimating and list the factors to be considered while preparing estimations. Discuss and list the qualities of a good estimator. Define specification, explain the importance of Specifications and list the factors to be considered.	01 Hour
2.	Define standardization, List the advantages of standardization, Explain overhead charges, stock incidental charges, contingencies , supervision charges, labour charges, Inspection/Inspectorate charges , transportation charges and miscellaneous charges.	01 Hour
3.	Explain tender/tender notice, quotation, comparative statement, purchase order and work order. Explain the importance/purpose of I.E Act and I.E Rules.	01 Hour
4.	Define the terms - earthing ,touch potential and step potential, explain the necessity of earthing, list the Points to be earthed, point out the factors influencing earth resistance, list the methods of reducing earth resistance, classify standard values of earth resistance for various installations. Specify the method of selecting the size of earth conductor.	01 Hour
5.	List the types /methods of Earthing. Explain Pipe earthing with diagram . Write the specifications of pipe earthing Explain Plate earthing with diagram. Write the specifications of plate earthing.	01 Hour
Unit II	SERVICE MAINS	10 Hours
6.	Define service mains. List the code of Practice for service mains.	01 Hour
7.	List the types of service mains-Explain Over Head Service Mains with diagram. List the materials. Write the specification of materials.	01 Hour
8.	Explain UG Service Mains with diagram. List the materials. Write the specifications of materials.	01 Hour
9.	Interpret standard wire size table, current ratings for Aluminium copper conductors and selection of size of conduit pipe as per the size and number of wires.	01 Hour
10.	Explain the general procedure for - Load calculation, selection of size and type of conductor/UG cable, discrimination of size of protective devices; decide the nature of supply and type of service main.	01 Hour
11.	Solve one simple example- Quantity calculation and schedules of materials for providing single phase OH service connection for electrification of a residential building.	01 Hour

12.	Prepare the estimate of cost for the above.	01 Hour
13.	Solve one simple example- Quantity calculation and schedule of materials for providing three phase OH service connection for electrification of a commercial building. Prepare the estimate of cost for the above.	01 hour
14.	Solve one simple example-Quantity calculation and schedule of material for providing single phase UG service connection for Electrification of a residential building. Prepare the estimate of cost for the above.	01 hour
15.	Solve one simple example-Quantity calculation and schedule of material for providing three phase UG service connection for Electrification of a workshop. Prepare the estimate of cost for the above.	01 Hour
Unit III	LIGHTING INSTALLATION	12 Hours
16.	List code of Practice for Lighting Installations. Interior Wiring - List the types and their applications. Point out the factors to be considered while selecting the type of wiring system.	01 Hour
17.	List the materials required for Interior wiring. Write their specifications. Specify the method of deciding the number of sub-circuits, calculating the quantity of wiring materials and accessories for the Interior Wiring.	01 Hour
18.	Solve one simple example on Interior wiring with single circuit- calculate the load-Propose Lighting and heating loads for a residential building. Determine the size of conductors, main switch, sub switches and protective devices.	01 Hour
19.	Draw wiring plan for the above residential building for AEH Installation. Explain the concept of horizontal run, vertical rise and vertical drop.	01 Hour
20.	Prepare the schedule of materials for providing lighting circuit wiring for the above.	01 Hour
21.	Estimate the cost for the above lighting circuit.	01 Hour
22.	Prepare the schedule of materials for providing heating circuit wiring for the above. Determine the size of conductors, main switch, sub switches and protective devices.	01 Hour
23.	Estimate the cost for the above heating circuit wiring.	01 Hour
24.	Solve one simple example on Interior wiring having 2 sub-circuits (lighting load greater than 800 W).Draw the wiring plan , calculate the load - Propose Lighting and heating loads for a residential building. Determine the size of conductors, main switch, sub switches and protective devices.	01 Hour
25.	Prepare the schedule of materials for the above.	01 Hour
26.	Prepare the estimate of cost for the above.	01 Hour

27.	Procedure (only) for converting lighting to AEH installation.	01 Hour
Unit IV	POWER INSTALLATIONS	08 Hours
28.	List code of Practice for Power Installations. List the materials required for power circuit wiring. Write their specifications.	01 Hour
29.	Solve one example - Prepare the layout diagram of machines showing clearances as per IS standards.	01 Hour
30.	Solve one simple example -Draw wiring plan of the Power circuit for a small workshop with one machines of 10 HP rating. Decide the type of wiring system.	01 Hour
31.	Explain the procedure for- load calculations, determine the size of conductors, main switch, Isolators, sub switches and protective devices for the above.	01 Hour
32.	Draw the SLD of Power Distribution Scheme showing grading/discrimination of ratings of protective devices.	01 Hour
33.	Prepare the schedule of materials with specifications for the above the workshop. Use surface conduit system.	01 Hour
34.	Prepare the estimate of cost for the above.	01 Hour
35.	Determine the rating of motor for IP set. Explain the concept (only) of pump house wiring.	01 Hour
Unit V	DISTRIBUTION LINES AND TRANSFORMER CENTRE	10 Hours
36.	List code of practice for Distribution Lines.	01 Hour
37.	Transformer centre –Describe the types- Pole mounted, plinth mounted, indoor and outdoor types.	01 Hour
38.	Solve one simple example on determining the rating of Distribution Transformer. Write Specifications of the Distribution Transformer.	01 Hour
39.	Draw the SLD of a Transformer centre indicating the size of protective devices. Prepare the schedule of equipments / Materials with specifications for a 11KV/415V, 100 KVA transformer centre.	01 Hour
40.	Prepare estimate of cost for the above transformer centre.	01 Hour
41.	415 V LT lines- List the Materials (only) with specifications and specify the method of calculating various LT line materials.	01 Hour
42.	Prepare the schedule of materials (only) for 3 phase 4 wire LT line for Electrification of a factory. One simple example.	01 Hour
43.	11 KV HT Lines (over head type) only- List the Materials with specifications. Specify the method of calculating various HT line materials.	01 Hour
44.	Explain tapping structure and list the materials required for tapping structure. Describe TOPO sheet and its use. Discuss the concept of combined estimate.	01 Hour
45.	Prepare the schedule of materials (only) for 11 KV single circuit HT line for Rural Electrification. One simple example.	01 Hour

Unit VI	TRANSMISSION LINES AND SUBSTATIONS	07 Hours
46.	List the code of practice for Transmission lines. List the transmission line materials and write their specifications.	01 Hour
47.	Classify the types of Towers, ACSR conductors and Number of Disc insulators in suspension string, strain string, span and height of towers for 66 KV, 110 KV, 220 KV transmission lines. Explain the concept of single circuit and double circuit transmission lines. Specify the method of calculating the Quantity of transmission line materials.	01 Hour
48.	Solve one simple example-Prepare the schedule of materials (only) for 66KV single circuit transmission line.	01 Hour
49.	Solve one simple example-Prepare the schedule of materials (only) for 110 KV single circuit transmission line.	01 Hour
50.	Solve one simple example- Prepare the schedule of materials (only) for 220 KV single circuit transmission line.	01 Hour
51.	66KV/11KV, 5 MVA substations- Draw the Single Line diagram and label the various equipments with ratings.	01 Hour
52.	66KV/11KV, 5 MVA substations- list the Electrical equipments/ materials (only) and write their specifications.	01 Hour

Suggested Student Activities:
(Any one to be submitted with 3 pages SELF HAND WRITTEN report):

1. Study the construction and working of chemical earthing and maintenance free earthing.
2. Draw the wiring plan of class rooms in a school/college (say 5 to10 class rooms) and prepare the estimate of cost for providing lighting circuit wiring.
3. Draw the wiring plan for an office and estimate the cost for providing lighting and power circuits.
4. Draw the wiring plan of an auditorium and estimate the cost of lighting circuit wiring. Study the illumination system/ type of
5. Visit the lathe machine shop or workshop in the polytechnic campus, prepare the layout plan of machines, draw the wiring plan of power circuit and estimate its cost.
6. Draw the distribution board /panel of your polytechnic. Draw the single line diagram of power distribution scheme and show the details of rating of MCBs, fuses and switches.
7. Study the distribution board, draw the (SLD) single line diagram of power distribution scheme in apartments/commercial buildings/hospitals/hotels. Show the details of rating of MCBs, fuses and switches.
8. Study the external electrical wiring of UPS and prepare estimate of cost for installation of UPS.
9. Draw the wiring plan of a 3BHK apartment, calculate the load and estimate the cost for providing lighting and heating circuits for Multi-storey (say 5 floors).
10. Visit electrical shops, identify the products displayed, know the specifications and collect the price list of electrical items/accessories used in lighting and heating circuits. Compare the prices of different makes.
11. Study the office procedures followed by section officers/junior engineers of electricity boards for tenders, estimation and execution of electrical works.
12. Study the electrical wiring of submersible pump sets. Estimate the cost.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students Grand Average/Total						14/4 =3.5 ≈4				

**Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing**

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1. Organization	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3. Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4. Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
Total marks						14/4=3.5 ≈4				

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 th week of sem 10-11 Am	I/II SEM		20			
	Year:					
Name of Course coordinator :						
Units: __ CO's: ____						
Question no	Question		MARKS	CL	CO	PO
1						
2						
3						
4						

Note: Internal Choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
1 st Test/6 th week	V sem, EE	ELECTRICAL ESTIMATION AND COSTING	20			
	Year: 2016-17	Course code:15EE54T				
Name of Course coordinator :						
Units Covered :						
Course Outcomes :						
Instruction : (1). Answer all questions						
Question No.	Question		MARKS	CL	CO	PO
1	List the factors to be considered while preparing estimates.		5	R	1	2,10
2	Sketch Pipe earthing and label the parts OR Explain the importance/purpose of I.E Act and I.E Rules.		5	U/A	1	2,10
3	Prepare the schedule of materials only for providing OH service connection to a residential building with 1 KW lighting and 2.5 KW heating load. The supplier pole is 10 m away from the building.		10	U U	2	2,10
CL: Cognitive Level, R-Remember, U-Understand, A-Application/Analyze, PO: Program Outcomes						

THE QUESTIONS SHALL BE FRAMED AS PER THE WEIGHTAGE GIVEN BELOW.

Unit No	Unit	Hours	Marks
1	Introduction	05	10
2	Service Mains	10	20
3	Lighting Installations	12	25
4	Power Installations	08	15
5	Distribution lines and Transformer centre	10	20
6	Transmission lines and substations	07	10
	Total	52	100

Model QUESTION Paper BANK:

Course Title: ELECTRICAL ESTIMATION AND COSTING

Course Code: 15EE63T

5 Marks Questions

CO1- Summarize the importance of estimation, specification and earthing.

CO2- Prepare the schedule of materials with specifications and estimates for service mains.

CO3- Draw the wiring plan for residential buildings, Prepare the schedule of materials with specifications and estimates for lighting Installations.

CO4- Draw the layout of machines with wiring plan for workshops. Prepare the schedule of materials with specifications and estimates for power insulation.

CO5- Prepare the schedule of materials with specifications for Distribution lines and estimates for transformer centre.

CO6- Prepare the schedule of materials with specifications for transmission lines and substations.

Cognitive level: REMEMBERING (UNIT-1 TO UNIT-6)

- 1) Define estimation. List the factors to be considered while estimating.
- 2) List the qualities of a good estimator.
- 3) List the importance of estimation.
- 4) Define specification. List the factors to be considered.
- 5) Mention the importance of specification.
- 6) Define standardization. List the advantages.
- 7) Define earthing?. List the points that need to be earthed.
- 8) Draw a neat diagram of pipe earthing and label the parts.
- 9) Draw a neat diagram of plate earthing and label the parts.
- 10) List the specification of pipe earthing
- 11) List the specifications of plate earthing.
- 12) List the factors on which earth resistance depends.
- 13) List the methods of reducing earth resistance.
- 14) Define service mains. List their types.
- 15) List the code of practice for service mains.
- 16) List the specification of conductor used in OH service main
- 17) List the specification of UG cable used in UG service main.

- 18) Draw a neat diagram of OH service main and label the parts.
- 19) Draw a neat diagram of UG service main and label the parts.
- 20) List the specifications of energy meter board.
- 21) List the specifications of fuse used service mains.
- 22) List the specification of MCB used in service mains.
- 23) List the code of practice for lighting installation.
- 24) List the types of interior wiring and their applications.
- 25) Point out the factors to be considered while selecting the type of wiring system.
- 26) List the specification for main switch used in power installations.
- 27) List the code of practice for power installation.
- 28) List the specifications of capacitor bank for 10HP power installation.
- 29) List the specifications of main control panel used in power installation.
- 30) List the specification of ELCB used in power installations.
- 31) List the code of practice of distribution lines.
- 32) List the specifications of a distribution transformer.
- 33) List the specifications of poles used in distribution lines.
- 34) List the specifications of GOS used in transformer centre.
- 35) List the specifications of lightning arrestor used in transformer centre.
- 36) List the specifications of the insulators used in distribution system.
- 37) List the specifications of conductors used in distribution lines.
- 38) Decide the rating of distribution transformer to supply a factory with 40HP load.
- 39) List the code of practice for transmission lines.
- 40) List the specifications of tower used in transmission lines.
- 41) List the specifications of power conductors used in transmission lines.
- 42) List the specifications of insulators used in transmission lines.
- 43) List the specifications of lightning arrestor used in 66KV /11 KV substations.
- 44) List the specifications of power transformer used in 66KV /11 KV substations.
- 45) List the specifications of the circuit breaker used in 66KV /11 KV substations.
- 46) List the specifications of CT used in 66KV /11 KV substations.
- 47) List the specifications of PT used in 66KV /11 KV substations.
- 48) List the specifications of DC supply and batteries used in 66KV/11KV substations.
- 49) List the specifications of a relay used in 66KV/11KV substations.
- 50) List the specifications of lightning arrestor used in 66KV/11KV substations.

CO1- Summarize the importance of estimation, specification and earthing.

Unit-1- Cognitive level: Understanding/Analyse

10 marks question on Introduction

1. Draw neat diagram of pipe earthing and label the parts with specifications. 10
2. Draw neat diagram of plate earthing and label the parts with specifications. 10
3. List the specifications of a) pipe earthing and b) plate earthing. 10

Cognitive level: Understanding/Analyse

10 Marks Question on Service Mains

1. List the materials used in over head service mains with specifications. 10
2. List the materials used in UG service mains with specifications. 10

CO2- Prepare the schedule of materials with specifications and estimates for service mains.

Unit-2- Cognitive level: Understanding/Analyse

20 Marks Question on Service Mains

1. Prepare the schedule of materials for providing OH service connection to a residential building with 1 KW lighting and 2.5 KW heating load .The supplier pole is 10 m away. Prepare the estimate of cost for the above. 20
2. Prepare the schedule of materials for providing UG service connection to a residential building with 1 KW lighting and 2.5 KW heating load .The supplier pole is 10 m away. Prepare the estimate of cost for the above. 20

CO3- Draw the wiring plan for residential buildings, Prepare the schedule of materials with specifications and estimates for lighting Installations.

Unit-3- Cognitive level: Understanding/Analyse

25 Marks question for Lighting installation (example)

3. The sketch given below shows the plan of a residential building which has to be wired up as an AEH installation. **(Plan to be given)**
 - a) Draw the wiring plan for AEH. 05
 - b) Propose the load requirements for lighting. 05
 - c) Prepare the schedule of materials for the above lighting circuit. 08

d) Prepare the estimate the cost for the above lighting circuit.
Use concealed conduit system of wiring.

07

CO4- Draw the layout of machines with wiring plan for workshops. Prepare the schedule of materials with specifications and estimates for power insulation.

Unit-4- Cognitive level: Understanding/Analyse

15 Marks question for power installation.

1. Draw the wiring plan for the given workshop and Prepare the schedule of materials with specification. (Layout to be given with HP ratings) 15
2. A 5 HP irrigation pump set is to be installed at the centre of a pump house of size 5 m x 5m. Assume the ceiling height as 3.5m . Draw the layout of pump house and wiring plan for power circuit (only). Prepare the schedule of materials with specifications. 15

CO5- Prepare the schedule of materials with specifications for Distribution lines and estimates for transformer centre.

Unit-5- Cognitive level: Understanding/Analyse

20 Marks question on Distribution lines and Transformer centre.

1. Prepare the schedule of materials and estimate the cost for erection of a 100 KVA transformer centre. 20
2. Prepare the schedule of materials (**only**) required for running a 10 KM long 11 KV HT distribution line for rural electrification. Assume average span as 80m. 20
3. The accompanying TOPO sheet shows the 15 KM route of a proposed 11 KV rural feeder providing terminal structures and rural guards. Prepare the schedule of materials with specifications for a) Terminal structure and b) Extension of 11 KV line. Assume average span as 80m. 20
4. Prepare the schedule of materials required for running a 10 KM long 415V LT distribution line. Assume span as 50m. 20

CO6- Prepare the schedule of materials with specifications for transmission lines and substations.

Unit-6 - Cognitive level: Understanding/Analyse

10 marks questions on transmission lines and substations

1. Prepare the schedule of materials (**only**) required for running a 80 KM long 66 KV single circuit transmission line. Assume average span as 300m. 10
2. Prepare the schedule of materials (**only**) required for running a 100 KM long 110 KV single circuit transmission line. Assume average span as 300m. 10
3. Prepare the schedule of materials (**only**) required for running a 120KM long 220 KV single circuit transmission line. Assume average span as 300m. 10
4. Draw the single line diagram of 66/11 KV, 5 MVA substation and label it. 10
5. Prepare the schedule of materials for a 5 MVA 66/11 KV substation with specifications. 10

Model Question Paper

V SEMESTER **Code:15EE54T**
ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL ESTIMATION AND COSTING

Note: Answer all the questions.

1. a) Define estimation. List the factors to be considered. 5
b) Define standardisation. List the advantages of standardisation. 5

2. Prepare the schedule of materials and estimate their cost for providing OH service connection to a residential building with 1 KW lighting and 2.5 KW heating load. The supplier pole is 10 m away from the building. 20

3. The sketch given below shows the plan of a residential building which has to be wired up as an AEH installation. **(plan to be given)**
 - a) Draw the wiring plan for AEH. 05
 - b) Propose the load requirements for lighting. 05
 - c) Prepare the schedule of materials for lighting circuit. 08
 - d) Prepare the estimate the cost for the above lighting circuit. 07

Use concealed conduit system of wiring.

4. Draw the wiring plan for the given workshop **(plan to be given)** and prepare the schedule of materials with specifications for providing power circuit wiring. 15

5. Prepare the schedule of materials with specifications and estimate the cost for erection of a 100 KVA transformer centre.

OR

Prepare the schedule of materials with specifications for tapping and extending a 11 KV rural feeder for a distance of 7 KM. Assume span as 80m. 20

6. Prepare the schedule of materials **(only)** required for running a80 KM long 66 KV single circuit transmission line. Assume average span as 300 m.

OR

List any five electrical equipments used in 66KV/11KV substation with specifications. 10