Government of Karnataka
DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

Programme	Electrical and Electronics Engineering	**Semester**	IV
Course Code	20EE44P	**Type of Course**	Programme Core
Course Name	Computer Aided Electrical Drafting (CAED)	**Contact Hours**	8 hours/week 104 hours/semester
Teaching Scheme	L:T:P :: 3:1:4	**Credits**	6
CIE Marks	60	**SEE Marks**	40

1.Rationale:
All equipment, installations, circuits and other electrical and electronic systems in the power and industrial sector need drawings for their manufacturing, installation, operation and maintenance. A technician working in design, shop floor and field area must possess the skill of reading, interpreting different drawings and to use Computer Aided Drawing (CAD) software to draw 2D & 3D Electrical drawings.

2. Course Outcomes/Skill Sets: *On successful completion of the course, the students will be able to*

CO-01	Study a given drawing and list all the electrical elements.
CO-02	Draw a single line diagram and control panel board wiring drawing for a given specification.
CO-03	Draw a winding and assembly drawing for a given machine and translate the assembly 2D drawing into a 3D drawing using CAD software.
CO-04	Draw a simple PLC module drawing for a given requirement using standard symbols.

3. Course Content:

Week	CO	PO*	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1	1,4	1. INTRODUCTION to CAD commands. Practice essential commands like – line types, line weight, scale, unit, 2. Layer, block, insert, explode, purge, table, attribute, quick select 3. view, multi-view, break, join, filter, find, pan, list match properties and related commands	Tutorial hours shall be used to practice drawings.	Practice the basic CAD commands. **Ref .7(1,2,3,4,5)**
2	1,2	1,4	Single line diagram of 110 KV/11KV MUSS Single line diagram 11KV of Substation	Tutorial hours shall be used to practice drawings.	1. Single line diagram of 110 KV/11KV MUSS. **Ref .7(10,11)** 2. Single line diagram of 11KV Substation. **Ref .7(12,13,14)**
3	1,2	1,4	1. Draw and Create BOM (Bill of Material): Electrical wiring of a residential/Hospital building 2.Draw and Create BOM (Bill of Material): Electrical wiring of a small workshop	Tutorial hours shall be used to practice drawings.	1. Draw the wiring layout of residential building/Hospital and generate BOM for a given plan with AEH. **Ref .7(7,8,9)** 2. Draw a wiring layout of a small workshop with 3 lathes, 1 drilling machine, 1 welding machine, 1

					grinding machine and generate BOM (Bill of Material).
4	1,2	1,4	Motor control Panel board Wiring.	Tutorial hours shall be used to practice drawings.	Draw MCC (Motor Control Centre) Panel board Wiring and create BOM. **Ref .7(15)**
5	1,2	1,4	Design a GA LT panel wiring drawing.	Tutorial hours shall be used to practice drawings.	Design an Electrical General Assembly of LT panel wiring. **Ref .7(16)**
6	1,2	1,4	Developed Winding Diagrams of 3-ph A.C. Machines: Single Layer Double Layer	Tutorial hours shall be used to practice drawings.	1.Develop a winding diagram- A.C. windings-Single Layer **Ref.7(6)** 2.Develop a winding diagram- A.C. windings- Double Layer
7	1,2	1,4	Developed Winding diagram of 1-ph, AC Induction Motor	Tutorial hours shall be used to practice drawings.	Develop a winding diagram for a 1-ph, Induction Motor, make terminal connections for Running & Starting Winding.
8	1,3	1,4	Transformer Assembly-Three-phase	Tutorial hours shall be used to practice drawings.	Three-phase core type 200KVA 33KV/400V transformer front elevation full in section, plan in full section. **Ref .7(18)**
9	1,3	1,4	Assembly drawing- Squirrel cage Induction motor.	Tutorial hours shall be used to practice drawings.	Draw the half end view and half sectional front elevation and half sectional end view for a 3HP 400V 50HZ 3PH 1440 RPM - Squirrel cage Induction motor. **Ref .7(19)**
10	1,3	1,4	Assembly drawing- Rotor of a 15KVA Alternator	Tutorial hours shall be used to practice drawings.	Draw the half sectional end view top half in section and half sectional front elevation for a Rotor of a 15KVA Alternator for a given sketch. **Ref .7(20)**
11	1,3	1,4	Assembly drawing – 4 Pole 25 KVA synchronous motor	Tutorial hours shall be used to practice drawings.	Draw half size half sectional elevation and half sectional end view. **Ref .7(21,22)**
12	3	1,4	3D Drawing- Squirrel cage Induction motor.	Tutorial hours shall be used to practice drawings.	3D view showing different parts. **Ref .7(23)**
13	1,4	1,4	PLC Module	Tutorial hours shall be used to practice drawings.	Design a Simple PLC Module showing I/O points. **Ref .7(24,25)**
Total in hours			**39**	**13**	**52**

***PO= Program Outcome as listed and defined in year 1 curriculum and CO-PO mapping with strength (Low/Medium/High) has to be mapped by the course coordinator. (Above only suggestive).**

4. CIE and SEE Assessment Methodologies

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
1.	CIE-1 Written Test	5	80	30	Average of three tests 30
2.	CIE-2 Written Test	9	80	30	
3	CIE-3 Written Test	13	80	30	
4.	CIE-4 Skill Test-Practice	6	180	100	Average of two skill test reduced to 20
5	CIE-5 Skill Test-Practice	12	180	100	
6	CIE-6 Portfolio continuous evaluation of Tutorial sessions through Rubrics	1-13		10	10
Total CIE Marks					60
Semester End Examination (Practice)			180	100	40
Total Marks					**100**

5. Format for CIE written Test

Course Name	**Computer Aided Electrical Drafting (CAED)**	Test	I/II/III	Sem	III/IV
Course Code	**20EE43P**	Duration	80 Min	Marks	30
Note: Answer any one full question from each section. Each full question carries 10 marks.					

Section	Assessment Questions	Cognitive Levels	Course Outcome	Marks
I	1			
	2			
II	3			
	4			
III	5			
	6			
Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, Cognitive level and course outcomes.				

6. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
	Average Marks= (8+6+2+2)/4=4.5						**5**

Note: Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

7. Reference:

Sl. No.	Description
1	Computer Aided Electrical Drawing - YOGESH, NAGARAJA,NANDAN PHI Publication
2	Electrical Drafting - S.F. DEVALAPUR

3	https://www.youtube.com/watch?v=pvKVy-eMDYc
4	https://www.youtube.com/watch?v=2ni0AWbloQA
5	https://www.youtube.com/watch?v=wIN61lmZByw
6	https://www.youtube.com/watch?v=OONCU5QbDpU
7	https://www.youtube.com/watch?v=asVQ3ncmqhY
8	https://www.youtube.com/watch?v=X1MsYDEkHpU
9	https://www.youtube.com/watch?v=8DEap6exAB0
10	https://www.youtube.com/watch?v=YXLhvA7dMb4
11	https://www.youtube.com/watch?v=ZRXlWoT-FRU
12	https://www.youtube.com/watch?v=Bk8YOLr0KFM
13	https://www.youtube.com/watch?v=Fa5gYiapD1E
14	https://www.youtube.com/watch?v=cKKvLXaV1g8
15	https://www.google.com/imgres?imgurl=https://5.imimg.com/data5/GZ/CR/MG/SELLER-40839587/capture7-500x500.PNG&imgrefurl=https://www.indiamart.com/proddetail/electrical-ga-general-assembly-design-22445785697.html&docid=t83B_C9sNcBtnM&tbnid=nqa2KujeGdTYhM&vet=1&w=500&h=339&hl=en-US&source=sh/x/im#imgrc=nqa2KujeGdTYhM&imgdii=pQlfLt4RiUOsdM
16	https://www.google.com/imgres?imgurl=https://5.imimg.com/data5/GZ/CR/MG/SELLER-40839587/capture7-500x500.PNG&imgrefurl=https://www.indiamart.com/proddetail/electrical-ga-general-assembly-design-22445785697.html&docid=t83B_C9sNcBtnM&tbnid=nqa2KujeGdTYhM&vet=1&w=500&h=339&hl=en-US&source=sh/x/im
17	https://www.youtube.com/watch?v=XsKbtm6OtAw
18	https://www.youtube.com/watch?v=fXOwgNYT0hg
19	https://www.youtube.com/results?search_query=Squirrel+cage+Induction+motor++assembly+cad+drawing
20	https://www.youtube.com/watch?v=nk_hmXUtiPk
21	https://www.youtube.com/watch?v=nk_hmXUtiPk
22	https://www.youtube.com/watch?v=rgP0aMth7LM
23	https://www.youtube.com/watch?v=fAN9jxydoMA&t=144s
24	https://www.youtube.com/watch?v=fTjd86ui5iM
25	https://www.youtube.com/watch?v=_0b2YDYFgZA
26	https://bescom.karnataka.gov.in/page/Departments+of+Corporate+Office/Quality%20Standards%20and%20Safety/Drawings/en
27	https://www.electricaltechnology.org/2012/02/star-delta-3-phase-motor-starting.html

8.1. CIE-1 Skill Test Scheme of Evaluation

SL. No.	Particulars/Dimension		Marks
1	Draw the single line diagram of a MUSS/substation i. Use of suitable commands ii. Labelling iii. Indexing	25 15 10	50
2	Draw the wiring diagram of a MCC Panel Board i. Use of suitable commands ii. Labelling iii. Indexing	25 15 10	50
		Total Marks	**100**

8.2: CIE-2 Skill Test Scheme of Evaluation

SL. No.	Particulars/Dimension	Marks
1	Design a Simple PLC Module showing I/O points. i. Use of suitable commands 20 ii. Labelling 10 iii. Indexing 10	40
2	Assembly drawings Sectional end view and front elevation (Front elevation and plan in case of transformer) i. Use of suitable commands 10 ii. Sectional end view/ front elevation 15 iii. Front elevation/plan 10 iv. Dimensioning 10 v. Labelling 05	50
3	Translate 3D drawing for the given Sketch (CAD)	10
	Total Marks	**100**

8.3: SEE Scheme of Evaluation

SL. No.	Particulars/Dimension	CO	Marks
1	**Winding diagrams** Draw the winding diagram using CAED software. 20 i. Develop winding table 05 ii. Draw sequence diagram 05 iii. Mark the poles 05 iv. Show the direction of induced emf and indicate the position of brushes and show the direction of current. 05 **OR** **Single line diagram** Draw the single line diagram of a MUSS/substation i. Use of suitable commands 20 ii. Labelling 10 iii. Indexing 10 **OR** **Building wiring drawing/Panel Wiring Drawing** Estimate and draw Electrical wiring of a residential building/ Estimate and draw: Electrical wiring of a small workshop. i. Use of suitable commands 20 ii. Labelling 10 iii. Indexing 10	**1,2**	40
2	**Assembly drawings** Sectional end view and front elevation (Front elevation and plan in case of transformer) i. Use of suitable commands 05 ii. Sectional end view/ front elevation 10 iii. Front elevation/plan 10 iv. Dimensioning 10 v. Labelling 05 **OR** 3D Drawing- Squirrel cage Induction motor. i. Use of suitable commands 25 ii. Labelling 15 iii. Indexing 10	**1,3, 4**	50
3	Viva-voce		10
	Total Marks		**100**

9. Equipment/software list with Specification for a batch of 20 students

Sl. No.	Particulars	Specification	Quantity
1	**Personal Computer**	• Operating **System**: 64-bit Microsoft Windows 10. • Processor: 2.5 GHz (3+ GHz recommended) • Memory: 8 GB (16GB recommended) • Disk space: 1TB. • Display: 1920 x 1080 resolution with True Color.	**20**
2	**Electrical Computer Aided Drafting Software/ AutoCAD Electrical 2021**	**Student edition**	**20**