



Subject: Computer-Aided Electronics Drawing & Drafting - DETEC15217

Type of course: Skill Enhancement Course (SEC)

Prerequisite: Basic knowledge of Computer

Rationale:

This course provides students with hands-on knowledge of computer-aided tools used for electrical drawing and simulation. It helps in developing skills for accurate circuit design, analysis, and validation using industry-relevant software, bridging the gap between theory and practical applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks					Total Marks
CI	T	P		Theory Marks		Practical Marks		CA	
			ESE	MSE	V	P	ALA		
0	0	4	2	0	0	10	40	50	100

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment;

Course Content:

Sr. No.	Course Content	Hrs	% Weightage
1	Introduction to Computer Aided Electronics Drawing Introduction to Computer-Aided Electronics Drawing for Electronics and Communication Engineering: Concept of Computer-Aided Drafting, comparison of manual vs CAD drafting, CAD system components (hardware and software), applications in electronics and communication engineering, and an introduction to the AutoCAD interface .	12	20%
2	Basic Layout Drawing & Editing Commands Coordinate systems (Absolute, Relative, Polar), Basic commands: Line, Polyline, Circle, Arc, Rectangle, Polygon, Editing commands: Move, Copy, Rotate, Scale, Trim, Extend, Mirror, Offset Object properties: Color, Linetype, Lineweight.	12	20%



3	<p>Electronics Symbols & Conventions Importance of standardization, symbols as per Bureau of Indian Standards (BIS) / IEC, Symbols for: Passive components (Resistors, Capacitors, Inductors), Semiconductor devices (Diodes, Zener diode, Transistors – BJT, FET, MOSFET), Integrated Circuits (ICs), Digital logic gates, Sources (AC/DC), Electronic switches. Symbols for communication and electronic systems: Amplifiers, oscillators, antennas, modulators/demodulators, filters.</p>	12	20%
4	<p>Electronic Circuit Drafting Analog circuits: Rectifier, amplifier, Digital circuits: Logic gates, flip-flops, Schematic diagram preparation, Introduction to PCB design</p>	12	20%
5	<p>Advanced CAD Features Layers and layer management for electronic schematics and PCB layouts, Blocks and attributes for reusable electronic components (resistors, capacitors, ICs, connectors), Dimensioning and annotation as per electronic drawing standards. Templates and standards based on BIS/IEC for circuit diagrams and PCB design, Plotting and printing of schematics, PCB layouts, and fabrication drawings.</p>	12	20%

Continuous Assessment:

Sr. No	Active Learning Activity (ALA)	Marks
1	<p>Electrical Symbols Library: Students will draw commonly used electrical and electronic symbols (such as resistor, capacitor, diode, transistor, switch, transformer, etc.) using CAD software like AutoCAD. Proper use of layers, blocks, and standard practices (as per Bureau of Indian Standards) should be followed. The completed symbol library drawing is to be uploaded on the GMIU Web Portal.</p>	10
2	<p>Electronic Circuit Drafting: Students will design and draft basic electronic circuits such as a rectifier, amplifier, and logic gate circuit using CAD tools. Proper symbols, connections, and annotations must be used. The circuit drawings are to be uploaded on the GMIU Web Portal.</p>	10
3	<p>PCB Layout Design: Students will design a simple PCB layout for an electronic circuit using tools like KiCad or EAGLE. Component placement, routing, and labeling should follow standard practices. The PCB design files and output images are to be uploaded on the GMIU Web Portal.</p>	10



4	Mini Project: Students will integrate their knowledge to design a small electrical/electronic system (such as home wiring system, power supply circuit, or control system). The work should include CAD drawings, PCB (if applicable), and brief documentation. All outputs are to be uploaded on the GMIU Web Portal.	20
Total		50

Suggested Specification table with Marks (Theory): NA

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	NA	NA	NA	NA	NA	NA

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes:

After learning the course the students should be able to:	
CO1	Understand basics of CAD and its applications using AutoCAD.
CO2	Utilize basic drawing and editing commands to create CAD drawings.
CO3	Interpret and apply standard BIS/IEC electronic symbols to accurately design and analyze circuit diagrams for electronic and communication systems.
CO4	Develop simple PCB layouts for electronic circuits.
CO5	Apply advanced CAD tools to create, manage, and present accurate electronic schematics and PCB layouts following standard conventions

List of Practicals:

Sr. No.	Descriptions	Unit No.	Hrs
1	To study the CAD environment and interface using AutoCAD.	1	4
2	To draw basic geometric shapes using CAD commands.	1	4
3	To apply coordinate systems (Absolute, Relative, Polar) in drawing.	2	4
4	To create drawings using basic commands like Line, Circle, Arc, and	2	4



	Polygon.		
5	To perform editing operations such as Move, Copy, Rotate, and Scale.	2	4
6	To apply object properties such as color, linetype, and lineweight.	2	4
7	To draw standard electrical symbols as per Bureau of Indian Standards.	3	4
8	To create a library of electrical symbols using blocks and attributes.	3	4
9	To prepare simple electrical circuit diagrams using standard symbols.	3	4
10	To draft analog electronic circuits such as rectifiers and amplifiers.	4	4
11	To draft digital circuits using logic gates and flip-flops.	4	4
12	To design a basic PCB layout using KiCad or EAGLE.	4	4
13	To use layers and layer management in CAD drawings.	5	4
14	To apply dimensioning and annotation in drawings.	5	4
15	To plot and print CAD drawings using standard settings.	5	4
	Total		60

Instructional Method:

The course delivery method will depend on the content requirements and the students' needs. The teacher, in addition to conventional teaching methods using the blackboard, may also use various tools such as demonstrations, role-playing, Quizzes, brainstorming, and MOOCs.

From the content, 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, and Virtual Laboratory

The internal evaluation will be done based on the Active Learning Assignment.

Practical/Viva examination will be conducted at the end of the semester for the evaluation of the performance of students in the laboratory.

Reference Books:

- [1] Computer Aided Design and Drafting for Electrical Engineers. Upper Saddle River, NJ, USA: Prentice Hall.
- [2] K. B. Raina and S. K. Bhattacharya, Electrical Drawing and Design. New Delhi, India: New Age International Publishers.
- [3] S. Tickoo, AutoCAD for Electrical Design. New Delhi, India: CADCIM Technologies.

- [4] [4] D. A. Madsen and D. P. Madsen, *Engineering Drawing and Design*, 6th ed. Clifton Park, NY, USA: Delmar Cengage Learning, 2011.
- [5] [5] N. D. Bhatt and V. M. Panchal, *Engineering Drawing*, 53rd ed. New Delhi, India: Charotar Publishing House, 2014.

