

Semester – III

Subject Name: Electrical Software Skill - I

Subject Code: 09EE3305

Diploma Branches in which this subject is offered: Electrical Engineering

Objective: In the rapidly evolving electrical field, understanding the installation, operation, and maintenance of equipment, as well as wiring of panels and buildings, requires proficiency in reading and developing electrical drawings. To enhance comprehension of electrical circuits and component behavior, the use of simulation tools is essential. Learning computer-aided design and simulation tools will improve students' practical skills and prepare them for industry requirements.

Credits Earned: 3 Credits

Course Outcomes: After learning the course, the students should be able:

1. Develop electrical and electronic circuit diagrams and wiring layouts using CAD software.
2. Analyze and modify electrical and electronic drawings to ensure correct connectivity and standard practices.
3. Construct and simulate electrical and electronic circuits to measure electrical parameters and waveforms.
4. Analyze circuit behavior by interpreting simulation results and waveform characteristics.

Pre-requisite of course: Basic knowledge of DC circuit, AC circuit, electrical practices and electrical control panel.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
0	0	6	3	00	30	20	25	25	100

Contents:

Unit	Topics	Contact Hours	Weightage (%)
1	Symbols and Schematic Drawing in AutoCAD • Introduction • Basic CAD interface • Basic command for AutoCAD drawing	0	0



	• Draw general symbols used in the electrical field Symbols of the generator, transformer, AC and DC motor and their starter, different switches, measuring instruments and various electrical instrument • Draw general symbols used in the electronics field Symbols of resistor, capacitor, inductor, diodes and various electronics switches		
2	Electrical and Electronics Circuit Diagrams & Panel Layout • Introduction • Draw combinational circuit Series and parallel circuit of resistor, inductor, capacitor and its combination • Draw house wiring diagram One switch for one fan, two-way switch for one lamp (staircase wiring), complete wiring of one room, wiring of a house. • Draw different parts of the electrical machine Winding diagram, pole, yoke etc. • Draw different electronics circuit • Prepare lighting panel layout	0	0
3	Simulation and Virtual Testing of Circuits • Introduction • Basics features and commands of simulating software (PSIM/MULTISIM) • Simulate various combinational circuits Series and parallel circuit of resistor, inductor, capacitor and its combination in ac circuit. Half wave, full wave and bridge rectifier, power amplifier and oscillator circuits • Measurement of voltage and current in various electrical and electronics circuit • Plot graph, waveform, and analyze the various combinational circuit Series and parallel circuit of resistor, inductor, capacitor and its combination in ac circuit. Half wave, full wave and bridge rectifier, power amplifier and oscillator circuits	0	0
4	Designing of PCB • Introduction • Basic of PCB designing software • Various sections of PCB designing software • Preparing PCB layout for electronic circuits	0	0

List of Experiments

Sr. No.	Unit No.	Name of Topics	Contact Hours
1	I	To study AutoCAD Electrical interface and apply basic drawing commands for creating simple geometrical shapes.	4
2	I	To draw general electrical symbols using CAD and take a printout.	4
3	I	To draw general electronics symbols using CAD and take a printout.	4
4	I	To prepare layered diagram using CAD Software.	4
5	I	To draw electrical machine parts using CAD software.	6
6	II	To prepare residential wiring layouts in CAD software.	6
7	II	To draw electrical circuits with proper labeling and annotations using CAD software.	4
8	II	To prepare power wiring diagram in CAD software.	4
9	II	To prepare control wiring diagram in CAD software.	4
10	II	To draw electrical panel layout in CAD software.	6
11	III	To simulate an electrical circuit and measure DC and AC voltage and current using appropriate virtual instruments.	6
12	III	To simulate combinational circuit of series R-L, R-C, R-L-C and observe voltage waveform and current waveform across each component.	6
13	III	To simulate combinational circuit of parallel R-L, R-C, R-L-C and observe current waveform and voltage waveform across each component.	6
14	III	To simulate and compare waveform of with and without filter in full bridge rectifier.	4
15	III	To simulate the star and delta connection of resistance and observe the relation of voltage and current in line and phase.	2
16	III	To simulate one switch two bulb wiring and two switch one bulb wiring.	2
17	III	To simulate series and shunt clipper circuit and observe output voltage.	4
18	III	To simulate clamper circuit and observe output voltage.	2
19	IV	Develop PCB layout for electrical and electronics circuits.	6

References:

1. David Báez-López, Félix E. Guerrero-Castro, "Circuit analysis with multisim", Morgan and claypool publishers.
2. Gaurav Verma, "*AutoCAD Electrical 2016 Black Book*", CreateSpace Independent Publishing Platform, 2016.

3. George Omura, “*Mastering AutoCAD 2013 and AutoCAD LT 2013*”, Sybex, New Delhi, 2013
4. Sham Tickoo, “*AutoCAD 2013 for Engineers and Designers*”, Dream tech press, New Delhi, 2013

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, performance, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. <https://www.lynda.com/AutoCAD-tutorials/AutoCAD-Electrical-Essential-Training/456354-2.html>
2. https://www.myigetit.com/Library/Topics/31?name=AutoCAD_Electrical
3. <https://knowledge.autodesk.com/support/autocad-electrical/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/AutoCAD-Electrical/files/GUID-54861097-CA39-4D32-AB52-DCE2972D7C24-htm.html>
4. <https://powersimtech.com/support/resources/video-library/>
5. <http://www.ni.com/white-paper/10710/en/>
6. <http://www.ni.com/multisim/technical-resources/>