



**Semester – III**

**Subject Name: Electrical Software Skill - I**

**Subject Code: 09EE2305**

**Diploma Branches in which this subject is offered:** Electrical Engineering

**Objective:** In the fast-growing electrical field, for the understanding of the installation of machinery, operation of any equipment, to do maintenance of any equipment and wiring of panels or buildings, knowledge of drawing reading and drawing making is required. To better understand various electrical circuits and the working of components, knowledge of simulation software is required. Learning software like CAD and MULTISIM will enhance students' ability to work in this fast-growing electrical market.

**Credits Earned:** 2 Credits

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

1. To identify and draw various electrical and electronics symbols.
2. To draw various electrical and electronic circuits using CAD software.
3. To read drawings prepared by CAD software.
4. To simulate various electrical and electronic circuits.
5. To prepare circuit on PCB for given electronics circuit.

**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	4	2	00	30	20	25	25	100

**Contents:**

Unit	Topics	Contact Hours	Weightage (%)
1	<b>Symbols and Schematic Drawing in AutoCAD</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Basic CAD interface</li> <li>• Basic command for AutoCAD drawing</li> <li>• Draw general symbols used in the electrical field Symbols of the generator, transformer, AC and DC motor</li> </ul>	8	14



	<p>and their starter, different switches, measuring instruments and various electrical instrument</p> <ul style="list-style-type: none"><li>• Draw general symbols used in the electronics field Symbols of resistor, capacitor, inductor, diodes and various electronics switches</li></ul>		
<b>2</b>	<p><b>Electrical and Electronics Circuit Diagrams &amp; Panel Layout</b></p> <ul style="list-style-type: none"><li>• Introduction</li><li>• Draw combinational circuit Series and parallel circuit of resistor, inductor, capacitor and its combination</li><li>• 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.</li><li>• Draw different parts of the electrical machine Winding diagram, pole, yoke etc.</li><li>• Draw different electronics circuit</li><li>• Prepare lighting panel layout</li></ul>	<b>14</b>	<b>25</b>
<b>3</b>	<p><b>Simulation and Virtual Testing of Circuits</b></p> <ul style="list-style-type: none"><li>• Introduction</li><li>• Basics features and commands of simulating software (PSIM/MULTISIM)</li><li>• 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</li><li>• Measurement of voltage and current in various electrical and electronics circuit</li><li>• 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</li></ul>	<b>28</b>	<b>50</b>
<b>4</b>	<p><b>Designing of PCB</b></p> <ul style="list-style-type: none"><li>• Introduction</li><li>• Basic of PCB designing software</li><li>• Various sections of PCB designing software</li><li>• Preparing PCB layout for electronic circuits</li></ul>	<b>06</b>	<b>11</b>



**List of Experiments**

<b>Sr. No.</b>	<b>Unit No.</b>	<b>Name of Topics</b>	<b>Contact Hours</b>
1	I	To draw given shapes in CAD and take a printout.	4
2	I	To draw general electrical symbols using CAD and take a printout.	2
3	I	To draw general electronics symbols using CAD and take a printout.	2
4	II	To draw DC and AC machine parts.	4
5	II	To draw house wiring diagram and take a printout.	4
6	II	To draw started circuits diagram for I.M. take a printout	4
7	II	To draw different types of rectifier using CAD and take a printout	2
8	III	To simulate a given circuit and measure voltage and current in a given circuit.	2
9	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
10	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
11	III	To simulate and compare waveform of with and without filter in full bridge rectifier.	4
12	III	To simulate the star and delta connection of resistance and observe the relation of voltage and current in line and phase.	2
13	III	To simulate one switch two bulb wiring and two switch one bulb wiring.	2
14	III	To simulate series and shunt clipper circuit and observe output voltage.	4
15	III	To simulate clamper circuit and observe output voltage.	2
16	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, “Masteringz0 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.myigitit.com/Library/Topics/31?name=AutoCAD\\_Electrical](https://www.myigitit.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/>