Lok Jagruti Kendra University
University with a Difference

# Diploma
# In
# Electrical Engineering

LJ Polytechnic

## Course Code: 025070405
## Design & Simulation Lab

| Programme / Branch Name | | | Diploma in Electrical Engineering | | | |
|---|---|---|---|---|---|---|
| **Course Name** | Design & Simulation Lab | | | | **Course Code** | 025070405 |
| **Course Type** | HSSC | BSC | ESC | PCC | OEC | PEC |

**Legends:** HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

## 1) Teaching and Evaluation Scheme

| Teaching Hours / Week / Credits | | | | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|
| **L** | **T** | **P** | **Total Credit** | **CCE** | **SEE (Th)** | **SEE (Pr)** | **Total** |
| 0 | 0 | 4 | 2 | 50 | - | 50 | 100 |

**Legends:**
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

## 2) Prerequisite

- ✓ Physics and Mathematics (Pre-university level)
- ✓ Measure basic electrical quantities/parameters
- ✓ Use major electrical/electronic machines//instrument/equipment

## 3) Rationale

All equipment, installations, circuits and other electrical and electronic systems in commercial, power and industrial sector need drawings for their manufacturing, installation, operation and maintenance. A technician working in design and shop floor must possess the skill of reading, interpreting different drawings and simulating electrical and electronics circuit for most of the activities. With the evolution of various computer software's the role of earlier draftsman is now taken over by Computer software. The Computer Aided Drawing (CAD) and simulation (MATLAB/SIMULINK, PSpice, MULTISIM) software will be used to perform various practical exercises in this course. This will enable the students to become competent for working in the fast growing information technology environment by enhancing their computer aided drawing, designing and simulating skills in the field of electrical and electronics engineering.

## 4) Objectives

Use various symbols and notations in electrical and electronics engineering drawings.

- ✓ Interpret drawings, draw interference and workout other technical details.
- ✓ Draw various electrical and electronics circuits according to standard practices using CAD software.
- ✓ Simulate/test simple electrical and electronics circuits using Simulation software
- ✓ Prepare a PCB for a given mini project.

## 5) Contents

| Unit | Topics | Sub-Topics | Learning Outcomes | % Weightage | Hours |
|---|---|---|---|---|---|
| 1 | Introduction to AUTOCAD | 1.1. Introduction to AutoCAD Electrical<br>1.2.Introduction to AutoCAD Interface | • AUTOCAD Electrical<br>• Adding a Drawing<br>• Create a new Drawing<br>• Drawing Properties | 10 | 4 |
| 2 | Electrical Symbols | 2.1. Create a Library Symbol<br>2.2. Symbol Builder<br>2.3. Circuit Builder | • Insert a symbols<br>• Workspace Settings<br>• Drawing Files<br>• Connecting a component<br>• Design Methodologies | 10 | 4 |
| 3 | Component Attribute Tools | 3.1. Component List<br>3.2. Copy circuitry<br>3.3. Wire | • Insert a Component<br>• Inserting a Child Components<br>• Connecting a component<br>• Relocating Components<br>• Aligning and Editing the Components<br>• Wire layers and types | 10 | 6 |
| 4 | Wiring, Arrow and Ladder Tools | 4.1. Insert & Modify wire<br>4.2. Source arrow<br>4.3. Destination arrow | • Automatic wire numbers<br>• Wire tagging<br>• Introduction to Connector Diagrams<br>• Inserting Connectors<br>• Link components by dashed lines | 10 | 6 |
| 5 | Conversion Tool and Panel Layout | 5.1. Convert text<br>5.1. Foot Prints | • Convert block<br>• Convert wires<br>• Convert arrows<br>• Footprints from Schematic list<br>• Footprints from icon menu | 10 | 6 |

## 6) List of Practicals / Experiments

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (outcomes in psychomotor and affective domain) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

| Sr. No | Experiment | Key Competency | Hours |
|---|---|---|---|
| 1 | To study about the AUTOCAD commands. | Commands | 2 |
| 2 | Draw electrical symbols using AUTOCAD. | Electrical Symbols | 2 |
| 3 | Draw following electrical starter using AUTOCAD. 1) DOL Starter 2) Star Delta Starter 3) Rotor Resistance Starter | Electrical Starter | 2 |
| 4 | Draw different types of domestic electrical wiring diagram using AUTOCAD. | Electrical wiring | 2 |
| 5 | Draw different types of AC-DC Converter using AUTOCAD. | AC-DC Converter | 2 |
| 6 | Draw different types of circuit breaker using AUTOCAD. | Circuit Breaker | 2 |
| 7 | Draw different types of Line Supports using AUTOCAD. | Line Supports | 2 |
| 8 | Draw different types of insulators using AUTOCAD | Insulators | 2 |
| 9 | Draw different types of arrangement of bus-bars. | Bus-Bars | 2 |
| 10 | Draw general arrangement wiring diagram of panel using AUTOCAD. | Panel Wiring | 2 |
| 11. | Draw different types of AC circuit using Auto-cad. | AC circuit | 2 |
| 12. | Simulate R-L series circuit and observe voltage wave forms across each component. | R-L series circuit | 2 |
| 13. | Simulate R-C series circuit and observe voltage wave forms across each component. | R-C series circuit | 2 |
| 14. | Simulate R-L-C series circuit and observe voltage wave forms across each component. | R-L-C series circuit | 2 |
| | | Total Hours | 28 |

## 7) Reference Books

1) Basic AutoCAD by Warren Blackadder
2) Practical Autodesk AutoCAD 2023 and AutoCAD LT 2023 by Jaiprakash Pandey, Yasser Shoukry
3) AutoCAD 2024: A Power Guide for Beginners and Intermediate Users by Sandeep Dogra

## 8) Open Sources (Website, Video, Movie)

1) https://www.autodesk.com/products/autocad/included-toolsets/autocad-electrical
2) https://www.udemy.com/course/complete-course-in-autocad-electrical-2021
3) https://www.capterra.com/p/179916/AutoCAD-Electrical