Lok Jagruti Kendra University
University with a Difference

# Diploma in Electrical Engineering

LJ Polytechnic

# Subject Code:025070106 Electrical Engineering Workshop

| Programme / Branch Name | | | Diploma in Electrical Engineering | | | |
|---|---|---|---|---|---|---|
| **Course Name** | Electrical Engineering Workshop | | | | **Course Code** | 25070106 |
| **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 Marks** |
| 0 | 0 | 6 | 3 | 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

✓ Basic knowledge of Electrical Components and Circuits.

## 3. Rationale

This course of Electrical Workshop is aimed to provide the students with more hands-on experience and also enable them to perform tasks such as the selection of different types of wires, cables, switches, etc. relevant to the current, voltage ratings and applications, are some of the basic skills required by industry from any electrical engineering diploma holder. Such skills can be developed through electrical workshop practices which will be useful in industries for using various electrical tools, measuring instruments, safety tools and devices Students also need to develop enough learning confidence to complete entire project work related to various courses in subsequent higher-level semesters. Hence, this is designed to develop these vital skills required by the electronic industry through various laboratory experiences and strategies like mini-projects.

## 4. Objectives

✓ This course aims to help the students to attain the following industry-identified competency through various teaching-learning experiences.

- Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.
- Identify and test various electrical components.
- Demonstrate safety measures against electric shock.

## 5. Contents

| Unit No. | Topics | Sub-Topics | Learning Outcome | % Weightage | Hours |
|---|---|---|---|---|---|
| 1 | Familiarization/Identification of Electrical tools with specification | 1.1. Pliers, nose plier, cutter, screwdriver, tester, test lamp etc.<br>1.2.Ammeter, voltmeter, wattmeter, clip on meter, Multimeter, Megger, etc. | • How to use Electrical Tools<br>• How to measure quantity like the voltage, current, etc. | 10 | 10 |
| 2 | Familiarization with different types of wires, cables, light sources, and switches. | 2.1.Single-core cable, multicore cable, single strand wire, multi-strand wire, shielded wire, different types of light sources, etc.;<br>2.2.Toggle switch, Rotary switch, Push button switch, micro switch, MCB, ELCB, etc. | • Types of wires, cables<br>• Light sources and switches.<br>• Protective Devices | 20 | 12 |
| 3 | Select/identify different types of resistors and capacitors. | 3.1.Rheostat, wire wound resistor, Carbon film resistor, Carbon composition resistor, fixed and variable potentiometer, etc.<br>3.2.Paper capacitor, electrolytic capacitor, Carbon composition resistor, fixed and variable potentiometer. | • Types of Resistor<br>• Types of Capacitor | 5 | 4 |
| 4 | Undertaking pipe earthing. | 4.1.Earthing, pipe earthing, plate earthing, Electrical safety tools.<br>4.2.Electrical safety rules, I.E. rules for electrical hazards and accidents | • Types and earthing<br>• Rules for Earthing. | 5 | 4 |
| 5 | Mini Projects | 5.1.Assembling of electrical circuit/system onboard, test and show the functioning. | • Household or Lab work usage projects use in daily work. | 60 | 10 |
| | | | | Total Hours | 40 |

## 6. List Of Practical / Exercise

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/Programme outcomes. Following is the list of practical exercises for guidance.

| Sr. No | Practical / Exercises | Key Competency | Hours |
|---|---|---|---|
| 1 | Identify various tools used for wiring. | Wiring Tools | 2 |
| 2 | Identify the symbols used in electrical circuit diagrams. | electrical circuit diagrams | 2 |
| 3 | Identify and connect various electrical measuring instruments and measure various electrical parameters like current, voltage, power. | Current, Voltage, Power Measurement | 2 |
| 4 | Connect different domestic appliances to the power supply and measure current drawn by them using 1) Ammeter. 2) Tong tester. 3) Multimeter. | Operation of Multimeter, Ammeter, Tong Tester | 2 |
| 5 | Identify different types of domestic wirings. | Domestic wirings | 2 |
| 6 | Identify and specify different types of wires, cables, cable joints used for different current and voltage ratings. | Types of wires, cables, cable joints | 2 |
| 7 | Identify different types of light sources, open circuit, closed circuit, and short circuit. | Types of Light Sources, Open, and Closed Circuit | 2 |
| 8 | Identify and specify different types of switches used for different applications as per current and voltage ratings. | Types of switches | 2 |
| 9 | Identify and specify different types of sockets and plugs used for different current and voltage ratings. | Types of sockets and plugs | 2 |
| 10 | Know the working of various electrical circuit protective devices (fuse, MCB,) | Protective Devices | 2 |
| 11 | Prepare a meter board for lighting and power installation using MCB, energy meter, fuse unit, DP switch, indicators, and bus bars. | Lighting and power installation | 2 |
| 12 | Identify and specify different types of conducting, insulating materials, resistors, capacitors, and inductors as per standard color code practice. | Color code practice for Resistor, Inductor, and Capacitor | 2 |
| 13 | Solder various resistors, capacitors, and electronic components on PCB. | Soldering | 2 |
| 14 | Conduct mock artificial respiration and first aid exercises to learn about safety procedures of first aid in case of electrical hazards. | Artificial Respiration | 2 |
| 15 | Undertake earthing practice (good demonstration) | Earthing practice | 2 |
| 16 | Mini Project: Cable and Wire Tester Circuit Diagram | | 2 |
| 17 | Mini Project: Water Level Indicator Circuit Diagram | | 2 |
| 18 | Mini Project: Automatic Street Light Control System | | 2 |
| 19 | Mini Project: Automatic parking light | | 2 |
| 20 | Mini Project: Burglar Alarm | | 2 |
| 21 | Mini Project: Automatic LED Emergency Light | | 2 |
| 22 | Mini Project: Infrared Motion detector | | 2 |

| | | | |
|---|---|---|---|
| 23 | Mini Project: Fire Alarm Project | | 2 |
| 24 | Mini Project: Lead-acid battery charger | | 2 |
| 25 | Mini Project: Simple function generator | | 2 |
| 26 | Mini Project: Mobile Fast Charger | | 2 |
| 27 | Mini Project: Sound Operated Light | | 2 |
| 28 | Mini Project: Square Wave Generator | | 2 |
| 29 | Mini Project: Sine Wave Generator | | 2 |
| 30 | Mini Project: Amplifier Circuit. | | 2 |
| | | **Total Hours** | **60** |

## 7. Reference Books

1) Electrical Engineering Materials by G.K Mithal - Khanna Publication
2) Electrical Engineering Materials and Semiconductor Devices by J.B. Gupta and Renu Gupta – S.K. Kataria & sons Publication.
3) Handbook of Electrical Engineering by S.L. Bhatia - Khanna Publication.
4) Electrical Wiring, Estimating and Costing by S.L. Uppal & G.C. Garg - Khanna Publication.

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

1) http://en.wikipedia.org/wiki/Electrical_wiring
2) http://www.kpsec.freeuk.com/components/switch.htm
3) http://home.howstuffworks.com/electrical-tools.htm