

B.Tech. Sem -I

Objective: Students of electrical allied programs will work with various types of electrical and electronic components and systems. Students should understand hazards related to electrical systems and should always work within safe working condition. Students of these branches should also be connect circuit even on Printed Circuit Boards. The student should also develop a skill required to identify faults and repairing of the same.

This course deals with basic introduction of system components of electrical and electronic systems, and provides hands on practice in assembling, interconnecting, testing, and repairing such system by making use of various tools used in electrical and electronic workshop.

Credits Earned: 1 Credits

Course Outcomes: After completion of this course, student will be able to

- Understand usage of different types of electrical & electronics tools, Cables, Switches, Electronics component (active & passive) and measuring instruments (Understand)
- Study and compare fuse, MCB, ELCB as protective Devices and to understand criticality of their function. (Evaluate)
- Understand circuits for Staircase wiring, Godown wiring, and induction motor starters. (understand)
- Study and compare use of different types of lamps, wiring of tube light and to measure and comment on sufficiency of Illumination level. (Evaluate)
- Carry out soldering & de-soldering electronics component on General Purpose Board. (Apply)
- Design hardware based project and trouble shoots the problems of related project. (Analysis)

Pre-requisite of course: NA

Teaching and Examination Scheme

| Teaching Scheme (Hours) | | | Credits | Theory Marks | | | Tutorial/ Practical Marks | | Total Marks |
|-------------------------|----------|-----------|---------|--------------|----|-----|---------------------------|----------------|-------------|
| Theory | Tutorial | Practical | | ESE (E) | IA | CSE | Viva (V) | Term work (TW) | |
| 0 | 0 | 2 | 1 | 0 | 0 | 0 | 25 | 25 | 50 |

Content:

| Electrical and Electronic Workshop |
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| <p>Electrical Workshop:</p> <ol style="list-style-type: none"> 1. Identify and select different electrical and electronic tools as per application. 2. Measure voltage, current, frequency, phase difference, power, power factor for single and three-phase supply 3. Wiring of fan, tube light, two-way control (staircase wiring), godown. 4. Wiring of instrument panel with various accessories following standard codes (Using connector strips, lugs, Wire Ferrules etc.). 5. Develop understanding of electric shock, understand rating and working of MCB, ELCB, RCCB and Fuse 6. Understand different lamps and lighting systems, requirements of lux for various applications, measurement of illumination level by using lux meter. 7. Understand construction and compare different type of cables used for power and control circuit. 8. Understand contactor, Pushbutton, Thermal overload relay, timers etc and construct contactor based circuit to lit a lamp and to remain on when green button is pressed. Lamp should be off when red button is pressed. 9. Understand need of earthing, study different earthing schemes and measure earth resistance by using earth tester. 10. To understand insulators and measure insulation resistance by Meggar. 11. Understanding of control and power circuit diagram. <p>Electronic Workshop:</p> <ol style="list-style-type: none"> 12. Identify and rectify open circuit, and short circuit faults in PCB/System. 13. Identify Value of Resistor and Capacitor based on code. 14. Solder and de-solder electronic components on different types of PCB 15. Test assembled electronic circuit for various parameters and faults 16. Identify and test electrical/electronic active and passive components 17. Use basic source and measuring instruments (power supply, function generator, DSO, DMM) 18. Identify various types of ports and connectors 19. Testing of resistor, capacitor, inductor, LED, diodes and transistor. |

Reference Books:

1. Electrical engineering drawing i&ii, Singh, Surjit, S.K. Kataria& sons

2. Handbook of Electrical Engineering, Bhatia, S.L, Khanna Publication
3. Electrical Wiring, Estimating and Costing, Uppal, S.L. & Garg, G.C., Khanna Publication
4. Electronic Devices, Thomas L. Floyd, Pearson (7th Edition)
5. Electronic Devices and Circuits, David A. Bell, Oxford Press (5th Edition)

List of Experiments:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency. Following is the list of experiments for guidance.

As it is laboratory course list is as per content given above

Suggested List of Student Activities:

1. Collect various types of components and prepare chart/model
2. Collect specifications of similar types of tools and instruments and prepare report comparing them.
3. Assemble one electronic system on PCB, test, and demonstrate in functioning (mini – project given by faculty member)

Open Ended Problems: Apart from above experiments a group of students has to undertake open ended problem/design problem. Few examples of the same are given below.

1. To DESIGN a device for charging small battery during door opening and closing using Coil and/or Magnet based DAMPING mechanism.
2. To DESIGN a mobile charger using Solar PV cell panel for offices and house hold. (The conventional charger may be eliminated).
3. To DESIGN/DEVELOP an INNOVATIVE electronic weighing machine.
4. To DESIGN develop an electronic lock for house in the workshop.
5. To DESIGN/DEVELOP an innovative electrical bell using electronics components in the workshop.

Major Equipments:**Components:**

Various types of resistors, capacitors, inductors, diodes, transistors, wires, cables, connectors, batteries, switches, relays, etc

Tools:

Plier, cutter, stripper, screw driver, crimping, soldering iron, de-soldering pump, hot-air soldering and de-soldering station, multi-meter, tester, series lamp, megger, clamp-on-meter

Instruments:

1. Digital Storage Oscilloscope
2. Function Generator (Frequency range upto 20 MHz) – need to have sine, square wave output.
3. Dual Power Supply (0-12V/15V DC)/3A
4. Micrometers for measurement of voltage and current with suitable ranges.
5. Multimeter
6. Megger,
7. Clamp – on – meter
8. Soldering and de-soldering station
9. Various electrical and electronic tool kits for testing and assembly.
10. Earth tester.
11. Tubelight fixture.
12. DOL starter with push buttons.
13. Kits for staircase and godown wiring.