Department of Physics

UG I Semester

Paper- Skill Enhancement

ELECTRICAL TECHNOLOGY

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Learner will Identify and Describe Basic Electrical Components and Tools	U, R
CO 2	Learner will able to demonstrate Safe Electrical Practices.	AP, E, C
CO 3	Learner will able to Repair and Maintain Domestic Electrical Appliances	An, AP
CO 4	Learner will Understand the Working of Basic Electrical Machines	U, C
CO 5	Learner will able to Design and Assemble Simple Electrical Projects.	AP, E
CO 6	Learner will apply Basic Electrical Knowledge to Solve Real-Life Problems.	AP

R-Recall, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Content of the Course

Theory (Credit :1)

No. of Lectures (in hours per week): 2.2 Hrs. per week

Total No. of Lectures: 15 Hrs. **Maximum Marks:** 100

Unit	Topic	Lectures
I	**Electricity Essentials: Safety, Tools & Components** 1.1 Basic Electricity: Electricity - Concept and Definitions, Origin of electricity, Generation of Electricity. 1.2 Personal protective equipment (PPE) and Emergency Procedures: Types of PPE used in electrical work (gloves, helmets, goggles, shoes), Selection criteria for PPE based on task/risk level, PPE inspection, maintenance, and replacement cycles, Safety signage and labelling for electrical zones, Electrical shock first aid (CPR basics), Fire extinguishers for electrical fires (Class C), Emergency response plan in case of an accident. 1.3 Identification and Use of Basic Electrical Tools: Hand tools pliers, screwdrivers, wire strippers, crimpers, Power tools: electric drills, soldering irons, Specialized tools: phase testers, insulation testers, Tool maintenance and safe storage practices, Use of tester, multimeter, soldering iron, and insulation tester in diagnosing faults, Safety protocols while handling repair and servicing. 1.4 Electronic Components: Active Components: Types & Uses, Passive Components: Types & Uses, Color codes of Passive Components.	5
II	**Domestic & Industrial Wiring: Tools to Testing** 2.1 Domestic and Industrial Wiring: Types of wires and insulation, Techniques for wire cutting, stripping, and jointing, Overview of wiring systems: casing & capping, conduit, cleat, CTS/TRS, PVC, concealed wiring, Circuit diagrams and wiring layouts, Introduction to earthing and its importance. 2.2 Types of Wiring Accessories and Their Uses: Switches, sockets, plugs,	4

	lamp holders, distribution boards, MCBs, and fuses, Selection criteria for residential and industrial installations. 2.3 Load Calculation and Selection of Wire Gauge: Basic methods for calculating electrical load for homes and small workshops, Guidelines for choosing wire size based on current rating and application 2.4 Testing and Fault Detection in Wiring Installations: Continuity testing, insulation resistance, and polarity tests, Common faults in domestic and industrial wiring and their troubleshooting methods.	
III	**Smart Handling of Home Electrical Appliances** 3.1 Electrical Appliances and Machines: Working principles of common appliances: fan, mixer, washing machine, cooler, iron, etc., Basic introduction to AC and DC machines (motors, transformers), Fault identification and safety in appliances. 3.2 Components of Electrical Appliances and Their Functions: Identification and role of key components like motors, switches, capacitors, thermostats, and heating elements, Disassembly and reassembly of basic appliances for understanding parts. 3.3 Energy Efficiency and Preventive Maintenance of Appliances: Understanding BEE star ratings, power consumption labels, and the importance of using energy-efficient appliances in homes and industries; implementing regular cleaning, lubrication, and safety checks to extend appliance life, reduce energy consumption, and ensure user safety.	4
IV	**Indian Knowledge System:** Ancient method to produce electricity using Copper plate, Zinc and acid solution & electroplating metals mentioned in AGASTYA SAMHITA, The understanding of magnetic attraction and polarity, Indigenous tools and wire joining methods (jute, cotton insulation).	2

References

Test/Reference Books:

1. Basic Electrical Engineering - V.K. Mehta & Rohit Mehta
2. Electrical Technology (Vol. 1 & 2)- B.L. Theraja & A.K. Theraja
3. Principles of Electrical Engineering - S.K. Sahdev
4 Electrical Wiring, Estimating & Costing - S.L. Uppal & G.C. Garg
5. A Textbook of Electrical Technology: Basic Concepts - R.K. Rajput
6. Bhartiya Gyan Parampara aur Vigyan - NCERT (Class 11/12 elective)
7. Indian Knowledge Systems: Concepts and Applications - Prof. B. Mahadevan (IIT Madras).
8. Energy and Sustainability in Ancient India - CSIR-NISCPR Publication
9. Introduction to Electrical Engineering - M.S. Naidu & S. Kamakshi, TMH
10. Basic Electrical Engineering - D.P. Kothari & I.J. Nagrath, Tata McGraw Hill
11. Principles of Electrical Engineering - V.K. Mehta, S. Chand Publications
12. Electrician 1st Year (Trade Theory) - Bharat Skills (NSQF Level 5)
13. CBSE Electrical Technology Curriculum (Code 819)
14. Agastya Samhita by Dr. Satyavrat Shastri or Gita Press Gorakhpur versions, "Describe methods rambling Galvanic cells, electroplating and mentions of energy generation"

Web Links:

1.**Basic Electrical Technology (NPTEL | IIT Kharagpur)** https aptelay.ancourses 1081080oarchive.mptelac.am Smptel.ae.in

2. **NOC: Fundamentals of Electrical Engineering (1IT Kharagpur)**hups, archive.mptel.ac.in courses 108 105 108105112 archve.nptel.ac.in-Sarchive uptelae.an Sarchive npteh.ac.mS

3. **Basic Electric Circuits (NPTEL ; IIT Kanpur)**https: archive.mptel.ae.an courses noc courses noc i S:M2 noc 17-ce13 sway.am.gov m Sarchivemptelag.in Stextofy ideo.nptel.ac.in+5

4. **Basic Electrical Circuits (SWAYAM | NPTEL)**https swayam.gow.in nd]_noc23_ce81 previewarehive.nptel.ae.in4 13sway am.gov.in+13swavam.gov.in 13

5. **Introduction to Electrical Engineering (SWAYAM! IT Dethi)**https: swayam govin ndl_noc22_ee109 prevrewwwayanigoy swayam.g.win-5swayam goy.in- 5

6. **Electrical Machines-I (NPTEL | IIT Kharagpur)**https. ar love npterac in courses 108 105 1081050i7 nptelagit iharclinve.mptel.ac.mdarcinve.mptei

7. **Electrical Machines-I (SWAYAM)**

https swayam.goy.in ndl_noc20_ce60 prevtewarchive.nptel ae in 13swayam.goy.in--13swayam.gov.in

List of Practical

Credit:02

1.Identitfication and selection of wires and cables (AC/DC)

2 Making Straight Joint in single core wire.

3 Making T-Joint and Western Union Joint (soldered unsoldered)

4 Practice of casing & capping wiring

5. Practice of conduit wiring (open and concealed)

6. Staircase wiring using two-way switches

7 Tube Light wiring and testing.

8 Socket and switch board wiring

9. Installation of fan with regulator and testing

10 Testing and installation of MCB and fuse in domestic board

11. Identification and safe use of basic electrical tools

12. Use and demonstration of personal protective equipment (PPE)

13. Safety procedures before handling electrical appliances

14. Safe isolation and circuit disconnection practices

15. Measuring voltage, current, and resistance using Multimeter.

16. Power and energy measurement using wattmeter and energy meter

17. Continuity test and polarity check using tester and Multimeter.

18.Insulation resistance test of wiring and appliances using smashed

19 Earth resistant measurement sing earth tester

20. Ceiling Fan: Dismantling, checking bearings, capacitor, winding, reassembly, testing.

21. Table Fan: Motor testing, regulator replacement, vibration check.

22. Mixer/Grinder: Fault diagnosis (jar, coupler, switch), repairing and testing

23. Electric Iron: Checking thermostat, heating element, wiring. Repairing Air Cooler: Servicing of motor, water pump, switch board, cleaning.

25. Washing Machine: Fault detection in motor, timer, capacitor, wiring; minor repairs.

26. Emergency Light: Battery check, circuit continuity, LED replacement

27. Electric Kettle/Geyser: Element and thermostat testing, safety fuse check.

28 Extension Board Assembly with socket, switch, fuse; testing with load.

29. Dismantling and assembling a small AC or DC motor.

30. Open circuit and short circuit test of a single-phase transformer.

Note: Student needs to perform at least 8 experiments.

Assessment and Evaluation (Theory)

Internal Assessment: No Internal Assessment	**Class Test Assignment/Presentation**	**Nil**
External Assessment: Time: 02.00 Hours	Section (A): Objective Type Questions	10 Marks
	Section (B): Short Questions (200 Words Each)	40 Marks
	Section (C): Long Questions (500 Words Each)	50 Marks

Assessment and Evaluation(Practical)	
Suggested Continuous Evaluation Methods:	
External Assessment	**External Assessment (Marks)**
Viva Voce on Practical	20
Practical Record File	30
Table work / Experiments	50
Total	100