

## Second Year

### Vocational Course Module II

#### Electrical Technology

Session: 2023-24 Onwards

#### Part A Introduction

Program: Under Graduate Course

<b>Course Code</b>	<b>V2-EEQM-ELECT</b>
<b>Course Title</b>	<b>Electrical Technology</b>
<b>Course Type</b>	<b>Vocational</b>
<b>Pre-requisite (if any)</b>	To study this course, student must have knowledge of the Physics subject in class 12th
<b>Course Learning outcomes (CLO)</b>	<b>After studying this Course the Student will be able to understand:</b>  1. The relevant basic concepts and principles in basic science subjects. 2. The manufacturing of different appliances. 3. The concepts, principles of working, maintenance, constructional details and functions of electrical motors, electrical appliances, measuring and testing instruments and electrical circuits. 4. Testing, installation, fault identification and repairing of electrical motors, appliances and instruments. 5. The basic concepts in engineering drawing. 6. Different types of electrical wiring.
<b>Expected Job role /career opportunity</b>	Electrician, Wireman In the market in Electrical Shops, In production unit of industries, In Scientific labs, In ITI, Self-employed etc.
<b>Credit Value</b>	2 (Theory) +2 (Practical) = 04

#### Part B- Content of the Course

Total No. of Lectures + Practical (in hours per week): **L-1 Hr / P- 1Lab Hr(=2Hrs)**

Total No. of Lectures /Practical: **L-30/P-30 (60 Hrs.)**

<b>Mod</b>	<b>Topics</b>	<b>No.of lectures</b>
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I	<p>1. Electric Current</p> <p>1.1 Electron drift velocity</p> <p>1.2 The idea of electric potential</p> <p>1.2.1 Resistance - Laws of resistance, units of resistance and resistivity.</p> <p>1.2.2 Colour Code for carbon resistors</p> <p>1.3 Types of resistors</p> <p>1.3.1 Non Linear resistor</p> <p>1.3.2 Varistor- Short and open circuit</p> <p>1.3.3 short in a series and parallel circuits</p> <p>1.3.4 opens in a series and parallel circuits</p> <p>1.4 Division of current in parallel circuit- Equivalent resistance.</p> <p>1.5 Maintenance of steady current in a circuit.</p> <p>1.6 Ideal constant-Voltage source: constant current source.</p> <p>1.7 Relation between electric field and potential. 1.7.1 Measurement of internal resistance.</p> <p><b>2. Electrical Instruments general idea about construction, working principle and measurement of</b></p> <p>2.1 Potentiometer- Sensitiveness and applications.</p> <p>2.2 Moving coil galvanometer- Measurement of current and voltage.</p> <p>2.2.1 Sensitivity of a Galvanometer.</p> <p>2.3 Wheatstone bridge and meter bridge</p> <p>2.3.1 Principle and applications to measure potential difference and for comparing electromotive force of two cells.</p> <p>2.4 Moving iron and moving coil voltmeters and ammeters,</p> <p>2.5 Dynamometer types of wattmeter.</p> <p>2.6 Ohm meter, megger and induction type energy meter- their circuit connection and application for measurement of electrical quantities.</p> <p>2.7 Digital Multimeter</p> <p>2.8 Induction Motor- General Principle and construction</p> <p>2.9 Rotor</p>	

	<p>2.9.1 Phase wound motor</p> <p>2.10 AC generator- Advantages and disadvantages of AC over DC</p> <p>2.11 (i) Photovoltaic cell (ii) Fuel cell Principle of operation</p>	
II	<p><b>Domestic Appliances- General idea-</b></p> <p>1.1 Safety policy, purpose of scope, Do's and Don'ts, earthling, permit to work system, safety instructions, housekeeping, personal protective equipment sand devices, constructions, transportation, safe guarding the public, fire, accident report, record and investigations, first aid, emergency preparedness and response, "5S" practice.</p> <p>1.2 Testing equipment's and basic control equipment's- Electronic line tester, series and parallel test lamp for simple and three phase system, thermostat, bimetallic relay, thermocouple, overload switch, electromagnetic relay.</p> <p>1.3 Electric Iron - Types- ordinary, automatic, steam, spray and laundry.</p> <p>1.4 Electric induction cooker- Electric induction plate cooker, simple rise Maker.</p> <p>1.5 Water Purifier- UV/RO, UV light effect on bacteria, reverses osmosis membrane process.</p> <p><b>2 Electrical wiring and Electrical Engineering Drawing</b></p> <p>2.1 Wiring diagram for domestic simple wiring.</p> <p>22 Symbols used for different electrical devices and equipments.</p> <p>2.3 Types of wiring cleat wiring, casing and capping.</p> <p>2.4 C.T.S./T.R.S. wiring, metal sheath wiring.</p> <p>2.5 Factors of selection of a particular wiring system</p> <p>2.6 Importance of switch</p> <p>2.7 Fuse and earthing of wiring system, types of faults, their causes and remedies.</p> <p>2.8 Types of earthing- Plate earthing and Pipe earthing. their procedure</p>	

	and application. 2.9 Loop in system of wiring connections I E rules related to wiring.	
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	<b>Practical</b>	<b>No.of lectures</b>
	<ol style="list-style-type: none"> <li>1. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.</li> <li>2. To assemble the component of a given electrical circuits</li> <li>3. <b>Multimeter-</b> Testing, Checking of components and measurement of Resistance. Inductance, Capacitance, Diode, Transistor. Voltage (AC/DC) current and checking of continuity of a given circuit</li> <li>4. Verification of Ohm's law</li> <li>5. Study of resistances in series, parallel and series parallel.</li> <li>6. Study of voltage sources in series, parallel and series parallel</li> <li>7. To study the change in the current in an electric circuit by changing its resistance.</li> <li>8. Determination of e.m.f. of a thermocouple.</li> <li>9. Determination of efficiency of electrical cattle with variable voltages.</li> <li><b>10. General idea about construction, working principle and measurement of</b> <ol style="list-style-type: none"> <li>a. Battery charger- circuit and different components.</li> <li>b. Filter circuit and voltage regulator- TL and 7 types filter circuits, IC voltage regulator.</li> <li>c. Emergency Torch- Miniature lamp type, Farmer Torch.</li> <li>d. Oven and Tandoor-Oven, Tandoor maker, microwave oven.</li> <li>e. Electric Toster- Ordinary, sandwich. Popup and Automatic.</li> <li>f. Coffee Maker- Coffee percolator, electric coffee Mug/Stirrer</li> </ol> </li> </ol>	<b>30</b> (02 Hours each)

## **Project / Field trip :**

### **Part C-Learning Resources**

#### **Text Books, Reference Books, Other resources**

#### **Suggested Readings:**

1. Jagathesan K, Vionoth Kumar and Sarvan Kumar R, Basic Electrical
2. Theraja B.L., Basic Electronics, S. Chand & Company New Delhi 2000.
3. Theraja B.L., A textbook of Electrical Technology. Volume 1, S. Chand & Company New Delhi 2005
4. Khandpur P, Morden Electronic Equipment Troubleshooting .Repair and Maintenance TMH 2006
5. Deo V. R., Electronics components and application.
6. Grob Bernard, Basic Electronics, McGraw Hill Book Co. 1985
7. Loveday G.C., Electronic Testing and Fault Diagnosis, A.H Wheeler Publishing.2002.
8. Chattopodhya D and Rakshit K K, Electronics fundamental Application, Age International.
9. Gupta S.L. and Kumar V., A hand book of Electronics, Pragti Prakashan.
10. Mithal K K Electronics Practical Computech Publication LTD.
11. Mehta V.K. and Rohit Mehta, Principles of Electronics, S. Chand & Company New Delhi 2005
12. Mithal G.K., Electronic devices and circuits, Khanna Publishers, 1990, 16th edn.
13. Sawhney AK, A course in electrical and electronic measurements and instrumentation, Dhanpat Rai and Co. (P) Ltd. 2003.
14. Talbar N Talbar and Upadhyay Akhilesh R, Electronic instrumentation (Analog and Digital) Dhanpat Rai and Co. (P) Ltd. 2001.

#### **Suggested equivalent online courses:e – reading:**

Youtube.com (passive component)

<http://fourier.eng.hmc.edu/e84/lectures/ch1/node3.html>

<https://www.electricaltechnology.org/2013/09/electrical-wiring.html>

<http://vlabs.iitkgp.ac.in/be/>

<https://nptel.ac.in/courses/108/108/108108076/>

<https://peda.net/kenya/ass/subjects2/physics/form-32/heoacc>

<https://youtu.be/w5ginsN8UX4>

<https://youtu.be/atXRn-cba88>

<https://youtu.be/ZGv9pblhg1g>