

ELECTIVE MODULE FOR NORMAL (TECHNICAL) STUDENTS

Module Title: Basic Electrical and Electronic Project Construction Duration: 20 hours
(2T 18P)

Pre-requisite: Nil

Aims of Module

- (i) To create a learning interest in the world of electricity and electronics and to acquire some basic theory and practical skills in building and checking simple electrical and electronic circuits and gadgets.
- (ii) To expose students to a possible career in the electrical and electronics industry by providing them with the fundamental skills and knowledge required in electronics

Learning Outcomes

At the end of the module, students will be able to:

- (a) Read and identify simple electrical and electronic circuits
- (b) Perform soldering and desoldering of wires and components
- (c) Carry out simple measurements and checks on voltage, current and resistors using multimeter
- (d) Fabricate simple electrical and electronics projects
- (e) Carry out basic fault-finding on the projects
- (f) Understand the knowledge and skills requirements of an electrical / electronics technician.

Module Outline

Students will be trained to observe safety rules when working with electricity, understand simple electrical and electronic circuits, identify electrical and electronic components, perform soldering and desoldering of wires and components, use electrical / electronics equipment to carry out simple measurements and checks, apply creativity and innovation in fabricating simple electrical / electronics project and carry out some basic fault-finding on the project

Outline of Module Syllabus

<u>Item</u>	<u>Technical Skills/Knowledge</u>	<u>Instructional Hours</u>	
		T=Theory	P=Practical
	<u>Theory (include some practical demonstration and practices also) – 5 hrs</u>		
1	Observe Safety Measures and Precautions <ul style="list-style-type: none">- When working with mains 230 v AC- Use of test pen to test “live” point- 2-pin and 3-pin 13A plugs and sockets. (how to connect a 13A plug)- Safe use of tools and equipment	0.5T	0.5P

2	<p>Common Electrical and Electronic Components and their uses</p> <ul style="list-style-type: none"> - Resistors, Capacitors, Inductors, Switches, Fuses, Circuit Board, Mains plug, magnets, electromagnet, relays, loudspeakers, Cables and Wires, Small dc motors - Connection of resistors in series and parallel connections - Resistor Colour Code, Reading Resistor and Capacitor values - Lamps and LEDs - Insulators and conductors - Use of multimeter to check resistance 	0.5T	1.5P
3	<p>Semiconductor (Transistors and Diodes) and ICs</p> <ul style="list-style-type: none"> - Diodes and their uses - Transistors and their uses - ICs and their functions - Identification of these devices and their pins - Connections of bulbs and LEDs – series and parallel connections - Testing diodes (also 7 segment) and bulbs 	0.5T	1.5P
4	<p>Batteries and Power supply(optional)</p> <ul style="list-style-type: none"> - Types of batteries - Series and parallel connections - Batteries in series and parallel - Battery voltage and current values. <p>Use multimeter to check voltage and current of batteries and power supply (optional)</p>	0.5T	1P

Practical Assignment and Exercises – 15 hrs

1	<p>Familiarisation and use of tools and equipment</p> <p>Tools- Soldering Iron, Iron stand, Desoldering Tool, Side cutter, long nose plier , test pen, working board</p> <p>Equipment – DC Power Supply(optional), Analogue Multimeter, Digital Multimeter</p>		0.5P
2	<p>a. Soldering practice exercises using wires and components. Check for accurate and correct connection and quality of solder joints</p> <p>b. Soldering of Electronic Projects</p>		1P 1P

3	Project Construction (include testing and simple fault-finding) – pick 4 out of 6 projects eg <ul style="list-style-type: none"> a. 2-way switch b. Single Switch controlling multiple lamps c. Electronics doorbell d. Light control unit e. Water level detector f. Temperature monitoring device 	10.5P
4	Recapitulation and introduction to subsequent module programmes	0.5P
Total		2T 18P

Teaching and Learning Approaches

Based on the needs and profile of the NT pupils, the theory will consist of 2 hours and practical training will consist of 18 hours, with an emphasis on group learning as well as individual learning. Students' interest will be sustained through the use of a wide variety of learning activities, including discussions on use of electricity and electronics in today's world, hands-on practice and constructing simple electrical / electronic projects.

For the practical sessions, students will learn to use the tools and equipment to construct simple electronic projects, carry out simple fault-finding and carry out basic measurements.

Completion Criterion

Students will be deemed to have successfully completed the module if they score the average marks of 50 for the 3 assessments. The guidelines for the assessments are given below.

<u>Assessment Component</u>	<u>Assessment Guidelines</u>
(i) <u>Assessment 1</u> Wire Soldering Exercise (25%)	Marks will be awarded for the quality of soldering, correct removal of insulation, layout and proper use of soldering iron and solder.
(ii) <u>Assessment 2</u> Measurement of voltage and/or resistance (25%)	Marks will be awarded for using the correct range and interpret the reading correctly
(iii) <u>Assessment 3</u> Project (One to be identified from the list) (50%)	Marks will be awarded for the quality of soldering, correct placement of components, correct removal of insulation, project is working, and proper use of soldering iron and solder and tools.

Target Audience

Sec 3 / 4 Normal (Technical) students

Target Size

20 students per class

Duration

20 instructional hours

Certification

ITE Certification of Attendance will be issued upon successful completion of the course.