ELECTIVE MODULE FOR NORMAL (TECHNICAL) STUDENTS

Module Title: Microcontroller Applications — Duration: 30 hours (3T 27P)

Pre-requisite: Nil

Aims of Module

(i) To create a learning interest in the world of Automation and to acquire some basic theory and practical skills in building and checking simple motor control circuits and gadgets.

(ii) To expose students to a possible career in the automation industry by providing them with some of the fundamental skills and knowledge required in automation.

Learning Outcomes

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

(a) Read and identify simple control circuits
(b) Carry out simple control of motor, lights from simple input switches
(c) Construct simple automation projects
(d) Carry out basic fault-finding on the projects
(e) Understand the knowledge and skills requirements of an automation technician.
(f) Carry out simple programming in microcontroller.

Module Outline

Students will be trained to observe safety rules when working with electricity, understand simple automation circuits, identify electrical and electronic components, apply creativity and innovation in constructing automation project and carry out some basic fault-finding on the project

Outline of Module Syllabus

Item	Technical Skills/Knowledge	Instructional Hours T=Theory P=Practical	
	Theory (include practical demonstration and practices) – 8 hrs		
1	Observe Safety Measures and Precautions - When working with mains 230 v AC - 2-pin and 3-pin 13A plugs and sockets. (how to connect a 13A plug) - Safe use of tools and equipment-power supply, AC-DC adaptor	0.5T	0.5P

2	Common Automation Components and their uses - Resistors, Capacitors, Switches, Fuses, Circuit Board, Mains plug, relays, Cables and Wires, Small dc motors - Internal construction of relay - Transistors and their uses - Activate relay to control motors and LEDs - Use of multimeter to check continuity	0.5T	2.5P
3	Microcontroller - Microcontrollers and their uses - Writing of simple program - Downloading of firmware to microcontroller - Identification of microcontrollers and their pins - Control of LEDs and motors	1T	3P
	Practical Assignment and Exercises – 22 hrs		
1	Familiarisation and use of tools and equipment Tools- Side cutter, long nose plier , working board Equipment – DC Power Supply, Analogue Multimeter or Digital Multimeter		0.5P
2	LED Matrix Diplay Project Construction Develop program to display alphanumeric characters on 5 columns by 7 rows LED display matrix	1T	8.0P
3	Project Construction (include testing and simple fault-finding) Eg a. Duration control of switching a lamp b. Single Switch controlling multiple LEDs c. Multiple Switch controlling single LED d. Light flasher unit e. Automatic door Some project items can be incorporated in the projects the students are currently doing in their D & T lessons.		10.5P
4	Phase Test and course evaluation		2.0P
	Total	3T	27P

Teaching and Learning Approaches

Based on the needs and profile of the NT pupils, the theory will consist of 3 hours and practical training will consist of 27 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 automation in today's world, hands-on practice and constructing simple automation projects.

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

Completion Criterion

Students will be deemed to have successfully completed the module if they score the average marks of 50 for the 2 assignments and 1 Phase Test. The guidelines for the assessments are given below.

	Assessment Component	Assessment Guidelines
(i)	Assignment 1 Display of alphanumeric character using LED matrix (30%)	Marks will be awarded for understanding of circuit diagram, correct wiring, correct control of motor
(ii)	Assignment 2 Project (One to be identified from the list) (50%)	Marks will be awarded for the correct layout and placement of components, correct development of program, downloading of program, project is working.
(iii)	Phase test Control of Lights and DC motor (20%)	Marks will be awarded for the correct layout and placement of components, proper downloading of program.

Target Audience

Sec 3 / 4 Normal (Technical) students

Target Size

20 students per class

Duration

30 instructional hours

Certification

ITE Certification of Attendance will be issued upon successful completion of the course. ITE Certificate of Achievement will be issued upon students meeting the assessment criteria.