CERTIFICATE IN ROBOTICS

DURATION: 90 Hours

CREDITS: 3

COURSE SYLLABUS

Objective

Robotics is a branch of engineering that involves the conception, design, manufacture and operation of robots. The objective of this course is to provide foundational understanding of Robotics Engineering. Also, can serve as a good starting point for individuals interested in exploring the field of robotics or as a supplementary learning opportunity for those already working in related areas.

Exit Profile

- Electronic programming
- Problem-Solving Abilities
- Creativity and Innovation
- Machine and high-level language
- Circuit Designing

Career Path

- Practical Engineering Skills
- Robotics Technician
- Robotic Programmer
- Automation Engineer
- Robotics Educator/Trainer
- Sales Engineer

Course Outline

Course Name:	CERTIFICATE IN ROBOTICS	Duration: 90 H	
Module	Topic	Duration	Total Duration
Module - I	DEFINITION, HISTORY, TYPES, ADVANTAGES	5	30 H
	ELECTRICITY, CONDUCTORS, AC/DC, COMPONENTS	5	
	LED CIRCUIT, VOLTAGE, OHM'S LAW, SERIES/PARALLEL CIRCUITS	5	
	CIRCUIT SIMULATION, SOFTWARE USE	8	
	BREADBOARD TYPES & PATTERNS	7	
Module - II	INTRODUCTION TO PROGRAMMING, MACHINE VS HIGH-LEVEL LANGUAGES	10	60 H
	TYPES OF ARDUINO BOARDS, DIGITAL VS ANALOG SIGNALS	10	
	IDE SETUP, CODE COMPILATION, SKETCHING	10	
	CONNECTING ARDUINO, BOARD CONFIGURATION	6	
	IF, ELSE, SWITCH, LOOPS, FUNCTIONS	8	
	TRAFFIC LIGHT SYSTEM	6	
	LDR, PIR, ULTRASONIC, RELAY, LCD 16X2	10	

Course in Detail

MODULE: 1

INTRODUCTION TO ROBOTICS & BASIC ELECTRONICS

Definition & Evolution of Robotics
- History & Milestones in Robotics
- Applications in Various Industries
- Future Trends in Robotics

Electrical Fundamentals for Robotics
- Basics of Electricity: Voltage, Current, Resistance
- Conductors, Insulators & Semiconductors
- Difference Between AC & DC

Electronic Components & Circuit Basics
- Resistors, Capacitors, Diodes, Transistors
- LEDs & Their Function in Circuits
- Understanding Ohm's Law
- Series vs Parallel Circuits

Circuit Simulation & Prototyping
- Introduction to Circuit Simulation Software (TinkerCAD, Proteus, etc.)
- Hands-on LED Circuit Design & Testing
- Introduction to Breadboards – Types & Wiring Patterns

Breadboard Types & Patterns
- Solderless Breadboards
- Solderable Breadboards (Protoboards)
- Printed Circuit Boards (PCBs)
- Breadboard Patterns (Internal Connections & Grid Systems)

MODULE: 1

PROGRAMMING & ARDUINO DEVELOPMENT

Introduction to Programming Concepts
- What is Programming? Machine vs High-Level Languages
- Basics of C/C++ for Embedded Systems
- Variables, Data Types, Operators

Getting Started with Arduino
- Understanding Arduino Boards & Their Types (Uno, Mega, Nano)
- Digital vs Analog Signals in Arduino
- Setting Up the Arduino IDE & Writing First Code

- Uploading and Debugging Code

Control Structures in Arduino Programming

- Using If, Else, Switch Statements
- Implementing Loops: For, While, Do-While
- Writing & Calling Functions

Hands-on Arduino Projects

- Traffic Light System – Implementing LED Control with Timers
- Sensor Interfacing – LDR (Light Sensor), PIR (Motion Sensor), Ultrasonic Sensor
- Actuator Control – Relay Modules & Output Control
- LCD 16x2 Display – Displaying Data from Sensors