

## **Module Synopsis**

### **MC 1 - Certificate in Electrical and Digital Circuit Fundamentals**

#### **Module 1 - Electrical Principles**

Covers the basic laws and theorems that govern the operation of electrical circuits. Topics covered include scientific notation, engineering notation, metric prefixes, definitions of energy and power, power sources, measuring instruments, DC and AC concepts, simple series and parallel networks, electromagnetism, inductor, inductance, transformers, Kirchhoff's Voltage and Current Laws, Current and Voltage Divider Rules.

#### **Module 2 - Digital Principles**

Covers the principles and design techniques to enable students to design simple combinational circuits using commercial SSI and MSI integrated circuits. Simple sequential logic circuits such as flip-flops and mono-stables are also introduced.

### **MC 2 Certificate in Electronics**

#### **Module 1 - Analog Electronics**

Builds upon and extends the fundamentals covered in Electrical Principles. Topics covered include capacitor, capacitance, Superposition Theorem, semiconductor physics, semiconductor devices such as diodes, special diodes and bipolar transistors, transducers such as thermistors, and application of operational amplifiers.

#### **Module 2 - Digital Electronics**

Builds upon and extends the fundamentals covered in Digital Principles. More complex circuits such as adders, multiplexers/de-multiplexers, decoders/encoders, counters and shift registers are covered.

### **MC 3 Certificate in PLC and Control System**

#### **Module 1 - PLC Applications**

Topics covered include PLC architecture, input and output connection, device selection, programming, testing and troubleshooting. PLC programming language will cover standard languages including ladder logic, function blocks and structured texts.

#### **Module 2 - Control System**

This module aims to provide foundational knowledge and techniques of basic control systems. Topics covered include control system representation using block diagram, system performance analysis, basic controller concepts and controller tuning techniques. Single-loop feedback control is the central theme of the module.

## **MC 4 - Certificate in Robotics & Artificial Intelligence**

### **Module 1 - Artificial Intelligence for Automation**

This module provides the background required to properly understand the techniques involved in Artificial Intelligence (AI) and Machine Learning (ML). It aims to equip students with knowledge of how to implement AI and ML systems and solutions for industrial automation systems and solutions.

Students will learn the background theory and how to use AI and ML tools. This will enable the students to apply AI and ML in their work or projects.

### **Module 2 - Robotics Technology**

This module aims to provide students with an insight of the trends and applications in the robotics technology. It provides students with a hands-on approach towards foundational knowledge and practical skills on key topics of robotic systems. This module introduces the student to the different methods and technologies to program and control robotic systems. Students learn to be effective in the design of controllers for robotic system.

The module offers a practical point of view into how to design systems that close the perception-process-action loop in both simulation and real robots applied to industry and service domains.

## **MC 5 Certificate in Sensor & Digital Manufacturing Technology**

### **Module 1 - Smart Sensors & Actuators**

This module aims to provide students with a broad knowledge of various types of smart sensors and an in-depth understanding of the principle & application of smart sensors & actuators in automation and process industries. Application of smart sensors in providing increased automation, improved communication and monitoring, along with self-diagnosis and new levels of analysis to provide a truly productive future will be covered in the module.

The coverage of this module includes overview and fundamentals of sensors and actuator system, principle and concept of smart sensors, operating principles of actuators, industrial process instruments, data sensing and analysis, signal conditioning techniques and finally smart sensors application in advanced manufacturing.

### **Module 2 - Digital Manufacturing Technology**

The module covers various components and technologies in Digital Manufacturing (Industry 4.0). Topics include networking of automation equipment using open communication standards to provide connectivity between machines and connectivity to Information technology services.

Practical sessions will cover configuration and programming of PLC system for automation tasks with web based and mobile apps information services. Condition monitoring with wireless sensors network for predictive maintenance will also be covered.