

# **Module Synopses**

## **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 1**

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 Network and Control**

### **Module 1 - Network and Control Applications**

Topics covered are networking fundamentals, ISO 7-layer communication model, TCP/IP, IP addressing, router and switch configuration, industrial networks, fieldbus technology, DeviceNet and SCADA systems. Emphasis will be given to the integration of the different networks.

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

This module aims to provide students with an insight of the latest trends and applications in the robotics technology as well as a hands-on approach by introducing foundations and practical 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 Sensors and Fieldbus**

### **Module 1 - Sensors and Instrumentation**

Topics covered are basic measuring concepts & instrumentation, temperature sensors, pressure sensors, flowmeters, strain gauges, signal conditioning for instrumentation, calibration and Advanced Instrumentation.

### **Module 2 - Fieldbus Technology**

The module aims to equip students with the knowledge to apply fieldbus technology to link instruments and field devices in a manufacturing plant to control system. Fieldbus is an industrial network system for real-time distributed control. The technologies covered are HART, Foundation Fieldbus and PROFIBUS. Strong emphasis will be given to the application of these technologies in the area of process and discrete manufacturing industries.