

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 Rapid Transit System

Module 1 - Rapid Transit System (RTS)

Provides students with knowledge and application skills in identifying the main features and functions of various systems within a RTS. The module covers history of rapid transit system, main functions and features of different sub-systems within the RTS (including Communication system, Electrical, Mechanical and Fire, Environment Control system, Integrated Supervisory Control System, Permanent Way, Signalling system, Safety and Security system), power network system, rolling stock, the principle of electric drives for train traction, mechanics of electric traction, the concept of Automatic Train Control (including Automatic Train Protection and Automatic Train Operation) and Automatic Fare Collection system.

Module 2 – Electrical Control System

This module aims to equip students with conceptual and practical knowledge in industrial control technologies and their applications. The components and sub-systems covered should be applicable to any industrial control system in general but also directly relevant to an Urban Transport System. The module is taught from an engineering system perspective by first having an overview understanding of the RTS as a means for urban transportation. It will then look into the diverse technologies used in the control system. The topics include history of Urban Transportation and RTS followed by control systems for Signalling, Automatic Train Supervision and Control, Automatic Train Operation and Train Protection. Supervisory Control and Data Acquisition (SCADA) and Programmable Logic Controller, as well as Communication Systems and Auxiliary equipment used in RTS will also be taught. Lastly, a good understanding of issues relating to safety and electromagnetic Compatibility and Interferences concludes the study of this module.

MC 3 - Certificate in Signalling, Communications & Control

Module 1 - Rapid Transit Signalling System

Provides students with knowledge of the principles of train control and supervision in an urban transit signalling system. The module covers roles and importance of the signalling system in Railway Operation, signalling system configuration, architecture and interfaces with other systems, Signal Interlocking System, Train Supervision System and Train Control System, fundamentals of digital communications and transmission line. Students will have a chance to demonstrate their knowledge of the module by designing and implementing a railway model as their graded assignment.

Module 2 - 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.

MC 4 - Certificate in Electrical Systems

Module 1 - Electrical Installation & Power Distribution

Builds upon and extends the knowledge covered in Electrical Principles. Topics covered include an overview of the power generation, transmission and distribution system, electrical safety and protection principles, analyze and design electrical systems based on the relevant codes of practices, testing and troubleshooting of electrical installation circuits, application of technology such as the KNX system in electrical installation, main equipment such as cables and associated protective devices used in the distribution of electrical power; standard requirements for effective delivery of electrical energy through distribution networks, principles, characteristics and applications of various types of protective relays; installation, maintenance and testing of electrical distribution systems with good engineering practices in accordance to the relevant Codes of Practices/Standards.

Module 2 - Electrical Power Systems

This module covers the basic operating principle of Electrical Power Supply system in Electric Vehicles and for a Mass Rapid Transit (MRT) system. The topics covered include DC-DC Converter, PWM Controller, DC & AC motors and Batteries.

MC5 - Certificate in Communication Systems

Module 1 - Networks & Protocols

This module covers the introduction of networks protocols using TCP/IP, and the concepts and techniques used in the various networks. It aims to provide the students with the fundamental knowledge for Broadband Communications module.

Module 2 - Digital Communications

Teaches the principles and techniques used in digital communication systems. Topics covered include signal analysis, digital pulse modulation (PCM, DPCM), digital modulation (ASK, FSK, PSK), transmission problems such as ISI, AWGN, BER & eye diagram, detection techniques, information theory and coding.