Module Synopses

Modular Certificate 1: Computer Programming and Networks

1. **DIGITAL PRINCIPLES**
   The aim of this module is to equip students with the knowledge, understanding and design techniques necessary, to enable them to design simple combinational logic circuits using commercial SSI and MSI integrated circuits. Additional topics covered include sequential logic circuits using as flip-flops and mono-stables.

2. **STRUCTURED PROGRAMMING**
   This module teaches students to write programs in a structured way. It emphasises good programming techniques and covers topics such as data types, input/output, selection control and loop-constructs, functions and data structures such as arrays.

3. **NETWORK FUNDAMENTALS**
   This module provides an overview of computer networking. It introduces networking terminology, concepts, devices, functionality, applications and standards required for computer networking. Students will learn to build LANs, perform basic network and service configurations, and implement IP addressing schemes.

Modular Certificate 2: Computer Networking

1. **LAN SWITCHING AND WIRELESS**
   This module provides students with a complete foundation in LAN switch and wireless networking. LAN switch covers basic switch concepts and configuration, virtual LANs, VLAN protocols and Inter-VLAN Routing. Wireless Networking covers basic RF theory, hardware installation, configuration and management, troubleshooting, security, and site surveying.

2. **COMPUTER NETWORKING**
   Provides students with an understanding of network fundamentals and computer network routing principles. Students will learn the difference between routing and routed protocols and to configure routers for LAN communications. Students will also be equipped with network troubleshooting skills and able to discuss LAN design issues involving multiple routers upon completion of the module.

3. **WIDE AREA NETWORKS**
   Discusses the WAN technologies and network services required in enterprise networks. This module demonstrates how to select appropriate devices and technologies to connect small to medium-sized business networks. Students learn how to implement and configure common data link protocols and how to apply WAN security concepts, principles of traffic access control and addressing services. Students will also learn how to detect, troubleshoot, and correct common enterprise network failure issues.

Modular Certificate 3: Computer Applications

1. **MICROCONTROLLER APPLICATIONS**
   Introduces the use of microcontrollers in a range of system applications. Students are taught how a microcontroller works, how to program it, and the use of microcontroller. In addition, students will learn analogue and digital support circuitry, sensors and actuators/displays required for a microcontroller based application. This module allows students to develop a project conceived around a microcontroller system with sensors and output devices.

2. **COMPUTER INTERFACING**
   Demonstrates how a personal computer can be used in interfacing applications using its internal ports (i.e. Parallel, Serial RS-232 and USB) as well as external ports using interface cards. Students are introduced to parallel, serial and USB data transfer and taught how to control electronic devices and gather information from the real world.

3. **OBJECT-ORIENTED PROGRAMMING**
   Equips students with knowledge of object-oriented programming concepts. Students will be able to develop software with modularity and reusability using object oriented approach, event-driven programming with GUI, and design more robust application program using exception handling.

Modular Certificate 4: Info-comm Services

1. **CLIENT-SERVER APPLICATIONS DEVELOPMENT**
   Aims to teach students features of the client and server side programming. Students will also learn practical skills in database programming using Structured Query Language (SQL). Students will develop a professional client/server application over the Web and or mobile devices for Internet applications.

2. **CLOUD COMPUTING SERVICES**
   Teaches students principles of Cloud Computing, differentiating the use of cloud systems, identification of potential benefits and risks as well as the ability to evaluate the basic offerings of cloud systems. The student will learn about the technologies and framework that support cloud computing and how to examine and recommend applications for the cloud.

3. **SERVER MANAGEMENT**
   Introduces students to the principles, concepts and techniques in managing servers. Upon successful completion of this module, students should be able to understand how to install servers and manage users over a network, avoid problems through fault tolerance, recover from problems through disaster recovery, troubleshoot network/ server problems, evaluate and select the appropriate tools to manage the network with emphasis on server management and administration.

Modular Certificate 5: IoT Technologies

1. **IoT SYSTEM DESIGN**

Students will gain understanding of the pervasive connectivity and architecture needed in smart city ecosystems. Topics covered include IT/OT convergence, networking technologies and protocols, user interface with IoT systems, smart city and advanced manufacturing architecture and infrastructure, and IoT systems security, case studies and examples of IoT systems and applications.

2. **DATA ANALYTICS**

Students will be introduced to various data mining tools, data processing techniques and algorithms used for the analysis and visualization of the collected data stored on both local and public cloud servers. Students will apply the knowledge gained to build a functional prototype system that is able to store and analyse data.

3. **MOBILE APPLICATIONS DEVELOPMENT**

Provides students with the skills and knowledge to develop and implement applications that can run on mobile phones. Students will be introduced to open-source software tools available for programme development, key concepts in mobile programming, user-interface classes, sensors and local data storage. By the end of the module, students should be able to conceptualise and complete an application.