Level 5 Diploma in Routing (111) 141 Credits

Unit: Technological Elements of Networks	**Guided Learning Hours:** 200
Exam Paper No.: 1	**Number of Credits:** 20
Prerequisites: Networking terminology knowledge	**Corequisites:** A pass or higher in Certificate in Networking or equivalence.

Aim: The unit paints a picture at the amazement of how an assembled network of various physical parts has turned into such an indispensable requisite in almost everybody's daily routine. Whether we need to work, research, entertain or communicate, a computer network will always come to mind. Several alterations have befallen upon a common person's lifestyle with the rise of technology. It reminds learners that computers would cease to exist if not for the magnificence of networking. Networking enables two or more computer systems to share important information and data. Smooth functioning of computer systems and networks connecting servers around the globe necessitate the skills and expertise of a professional hardware and networking engineer. Information technology is the cornerstone of today's flourishing world of business and is largely dependent upon the proper management and implementation of computer hardware and networking. A highly progressive field, hardware and networking hold tremendous promise for those studying to be professionals. This unit will provide learners a much needed knowledge of computer hardware and networking, enabling them to identify and rectify the onboard computer network hardware, network software and network related problems. With the help of this unit; learners will be able to understand the networking hardware specifications that are required to run networking operating system and various onboard protocols. The unit objectives are: understanding basic concept and structure of computer hardware and networking; identifying hardware, underlying architectures and protocols; being able to apply knowledge about network peripherals to identify/rectify problems onboard; integrating the various Local Area Network and Wide Area Network architectural structures.

Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.

Special Requirements: The course requires a combination of lectures, demonstrations and class discussions.

Intended Learning Outcomes:	Assessment Criteria:
1. The network classifications; characteristics of the medium used to transport the data, communications protocol used, scale, topology, and organisational scope.	1.1 Define network classifications 1.2 Distinguish between LAN and WAN 1.3 Compare and contrast peer-to-peer vs Server based network 1.4 Describe server functions 1.5 Describe network topologies 1.6 Describe how two computers communicate
2. The OSI layer responsible for binary transmission, cable specification, and physical aspects of network communication.	2.1 Identify different networking cable media 2.2 Distinguish baseband and broadband 2.3 Describe network interface card functions 2.4 Explain wireless technology and compare with networked technology 2.5 Describe data communication methods
3. Understand the network architecture as a blueprint of the complete computer communication network, which provides a framework and technology foundation for designing, building and managing a communication network.	3.1 Outline network topology access methods 3.2 Describe how networks send and receive data 3.3 Outline Ethernet network architecture 3.4 Describe IEEE roles 3.5 Describe token ring network architecture 3.6 Discuss Appletalk and ArcNet architecture

		3.7	Describe how layering divides the communication tasks into a number of smaller parts, each part accomplishing a particular sub-task and interacting with the other parts in a small number of well-defined ways.
		3.8	Demonstrate how layering allows the parts of a communication to be designed and tested without a combinatorial explosion of cases, keeping each design relatively simple.
		3.9	Describe why the TCP/IP network architecture is based on an open network architecture .
4.	The standards for network operating systems (NOS); how they provide file, print, directory, application services, and other generalised services, such as those for database, in an electronic networking environment.	4.1 4.2 4.3 4.4 4.5	Identify network operating system features, components and services Describe Windows network operating system architecture Outline the OSI layer model Explain the IEEE 802 project model Analyse the role of device drivers
5.	The network framework for implementing network protocols; defining interfaces that protocols use to invoke operations on one another.	5.1 5.2 5.3 5.4 5.5	Define protocol Identify the role of protocols Describe the TCP/IP protocol stack Distinguish NetBIOS vs NetBEUI Differentiate logical and physical address
6.	How Functional Network Connectivity (FNC) measures the temporal dependency of functional networks, latency and connectivity analysis tools.	6.1 6.2 6.3 6.4	Explain network connectivity issues Describe LAN devices and their functions Explain network connection services Describe remote access connection protocols
7.	How network allows multiple computers to send files and folders to one another, share a single Internet connection and print from the same printer.	7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8.	Outline network design criteria categories Explain the process decision and steps in designing a network Distinguish between distributed and centralised computing Describe how the distributed model processes data Describe hardware compatibility issues Explain how centralised computing processes data Identify networking hardware functions Analyse how the setting up of a network is a challenging task
8.	Network security policies and procedures for files shared inside and outside the network.	8.1 8.2 8.3 8.4 8.5 8.6 8.7	Demonstrate creating a network share Describe sharing in peer-to-peer and client/server environments Describe user and group accounts Demonstrate how to create user-and group accounts Describe public folders Explain user rights Demonstrate accessing public folders
9.	The necessity of network security,	9.1	Explain the need for network security

	and discuss the elements of a secure network.
solutions for securing network infrastructures and VPNs.	9.2 Identify network security tools 9.3 Examine network security enhancement tools 9.4 Describe different types of network attacks 9.5 Describe Network Security Principles 9.6 Describe RAID levels 9.10 Describe how to build security into the network by defining zones, implementing secure routing protocol designs
10. Network printing configuration and the functions of print devices.	10.1 Outline networking print configuration process 10.2 Describe the network print operation 10.3 Identify the role of printer spoolers and queues 10.4 Be able to share a network printer

Methods of Evaluation: A 2½-hour written examination paper with five essay questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake project/coursework in Technological Elements of Networks with a weighting of 100%.

Recommended Learning Resources: Technological Elements of Networks

Text Books	• Elements of Network Protocol Design by Mohamed G. Gouda ISBN-10: 0471197440 • Local Access Network Technologies by P. France ISBN-10: 0852961766 • Tools for Teaching Computer Networking and Hardware Concepts by Nurul ISBN-10: 1591407354
Study Manuals	BCE produced study packs
CD ROM	Power-point slides
Software	Windows Client and Server Operating System