Level 4 Certificate in Networking (107) 129 Credits

Unit: Networking Essentials	**Guided Learning Hours:** 260
Exam Paper No.: 1	**Number of Credits:** 26
Prerequisites: Basic knowledge in the use of Microsoft Windows Applications.	**Corequisites:** A pass or higher in Diploma in Information Technology or equivalence
Aim: Learners will learn to make networking cables, structured wire installations, build and troubleshoot simple Local Area Networks (LANs). Other topics include the OSI Model, data link and network layer devices, IP addresses, subnet masking, ARP and RARP. On completion of the unit, learners will be able to identify the components of a LAN and determine the type of network design most appropriate for a given site; identify the different media used in network communications, distinguish between them, and determine how to use them to connect servers and workstations in a network environment; differentiate between the different networking standards, protocols, access methods and determine which would be most appropriate for a given LAN; recognise the primary network architectures, identify their major characteristics, and determine which would be most appropriate for a proposed LAN; identify the primary functions of network operating systems and distinguish between a centralised computing environment and a client/server environment; determine how to implement and support the major networking components (including servers, operating system, and clients), and propose a system for adequately securing data on a given LAN and protecting the system components; distinguish between LANs and Wide Area Networks (WANs), identify the components used to expand a LAN into a WAN, and determine how to implement an appropriate router in the larger LAN/WAN environment; identify strategic LAN support tools and resources, and determine how to use these in troubleshooting basic network problems; develop a plan for implementing a LAN that incorporates the concepts and components presented and identify the components of the Internet.	
Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: The unit requires a combination of lectures, demonstrations, discussions, and hands-on labs.	

Intended Learning Outcomes:	Assessment Criteria:
1 Network, its advantages relative to standalone; the LAN, WAN topology, file and print services; the layers of OSI Model.	1.1 Explain the advantages of networked computing relative to standalone computing 1.2 Identify elements of a network 1.3 Describe several specific uses of a network 1.4 Distinguish between client/server and peer-to-peer networks 1.5 Describe specific networking services within each layer of OSI Model 1.6 Explain how two systems communicate through OSI Model 1.7 Discuss the structure and purpose of data frames 1.8 Describe the types of addressing contained in OSI Model.
2 Characteristics of TCP/IP, NetBIOS, AppleTalk; position of network protocols in OSI Model.; data transmission terminology concepts; analog and digital data transmission; transmission impairments; channel capacity including full-duplexing, attenuation, and noise.	2.1 Identify the TCP/IP protocol suite and its functions 2.2 Describe different protocols addressing scheme 2.3 Describe how to install protocols on Windows clients 2.4 Describe the physical characteristics of coaxial cable, STP, UTP, and fiber-optic media 2.5 Explain the benefits and limitations of different networking media 2.6 Identify the best practices for cabling buildings and work areas

		2.7	Describe the methods of transmitting data through the atmosphere.
3	The basic and hybrid LAN physical topologies, their uses, advantages and disadvantages; functions of LAN connectivity hardware and isolating problems associated with connectivity hardware.	3.1	Describe a variety of enterprise-wide and LAN physical topologies, their uses, advantages, and disadvantages
		3.2	Describe transmission methods and logical topologies.
		3.3	Describe how to install and configure a network adapter (network interface card)
		3.4	Describe the factors involved in choosing a network adapter, hub, switch, or router
		3.5	Describe the functions of repeaters, hubs, bridges, switches, and gateways
		3.6	Describe the types of different routing protocols.
4	Network applications that require WAN technology, different varieties of WAN transmission and connection methods.	4.1	Identify the criteria for selecting an appropriate WAN topology, transmission method, and operating system
		4.2	Analyse and identify the hardware and software requirements for connecting to a network via modem/ router
		4.3	Demonstrate how to install and configure simple remote connectivity for a telecommunicating client
		4.4	Explain and compare the different types of switching used in data transmission
5	The functions and features of a networking operating system; file and print sharing; account administration for users and security.	5.1	Define the requirements for a Windows network environment
		5.2	Describe how a Windows server fits into an enterprise-wide network
		5.3	Demonstrate how to perform a simple Windows Server installation
		5.4	Describe how to manage simple user, group, and rights parameters in Windows Server
		5.5	Describe how Windows Server integrates with other popular network operating systems.
6	Ethernet history, and Ethernet technology that drives many of the world's Local Area Networks (LANs).	6.1	Define Ethernet
		6.2	Describe how Ethernet works
		6.3	Describe the different Ethernet standards
		6.4	Outline the IEEE naming conventions
		6.5	Compare and contrast Ethernet types distances are in meters.
		6.6	Describe the types of Ethernet frames
7	TCP/IP network addressing, subprotocols, the purpose and procedure for subnetting; the elements of an effective troubleshooting methodology; network trouble shooting documentation; troubleshooting tools and network management tools.	7.1	Describe the history and uses of BOOTP, DHCP, WINS, DNS, and host files
		7.2	Demonstrate how to employ multiple TCP/IP utilities for network troubleshooting
		7.3	Define and explain TCP/IP applications, such as Internet browsers, e-mail, and voice over IP
		7.4	Demonstrate how to follow a systematic troubleshooting process to solve networking problems
		7.5	Describe how to use a variety software and hardware tools to diagnose problems

		7.6	Explain practical issues related to troubleshooting.
8 How to perform a baseline analysis to determine the state of a network including the steps involved in upgrading network operating system software.		8.1	Outline how to plan and follow regular hardware and software maintenance routines
		8.2	Describe the steps involved in adding or upgrading the network hardware
		8.3	Describe the potential pitfalls of making changes to the network
		8.4	Examine research networking trends to plan future networking upgrades
9 The characteristics of a network that keep data safe from loss or damage and protects an enterprise-wide network from viruses.		9.1	Explain network and system-level fault-tolerance techniques
		9.2	Examine issues related to network backup and recovery strategies
		9.3	Describe the components of a useful disaster recovery plan
10 Security risks in LANs, WANs and how physical security contributes to network security.		10.1	Describe hardware and design-based security techniques
		10.2	Demonstrate using network operating system techniques to provide basic security
		10.3	Describe how to use enhanced security through specialised software
		10.4	Describe the elements of an effective security policy

Methods of Evaluation: A 2-hour written examination paper with Section A and Section B. Section A has 40 multiple choice questions. Section B has three essay questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake project/coursework in Networking Essentials with a weighting of 100%.

Recommended Learning Resources: Networking Essentials

Text Books	• Networking Essentials by Dave Kinnaman. ISBN-10: 0070676852 • Computer Networking Essentials by Debra Littlejohn Shinder. ISBN-10: 1587130386 • Networking Essentials Rapid Review Guide by A. Pastore. ISBN-10: 1882419901
Study Manuals	BCE produced study packs
CD ROM	Power-point slides
Software	None