COMPETENCY BASED CURRICULUM

FOR

INFORMATION COMMUNICATION TECHNOLOGY

KNQF LEVEL 5

PROGRAMME ISCED CODE: 061 2454A

NETWORK DESIGN AND MANAGEMENT

UNIT CODE: 0612 451 07A

Duration of Unit: 200 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform Computer Networking

Unit Description

This unit covers the competencies required to perform network design and management**.** It involves designing computer network, installing computer network, testing computer network and performing computer network maintenance.

Summary of Learning Outcomes

LEARNING OUTCOMES	DURATION (HOURS)
1. Design computer network	40
2. Install computer network	60
3. Test computer network	30
4. Perform computer network maintenance.	30
TOTAL	**160**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Design computer network	1.1 User needs collections 1.1.1 Introduction to computer networking	• Practical assessment • Project

	1.1.1.1 Definition of Computer Network terms 1.1.2 Computer Network types 1.1.2.1 LAN 1.1.2.2 WAN 1.1.2.3 PAN 1.1.2.4 MAN 1.1.3 Network topologies 1.1.3.1 Star 1.1.3.2 Ring 1.1.3.3 Mesh 1.1.3.4 Hybrid 1.1.3.5 Point to Point 1.1.4 Components of a computer network 1.1.4.1 switches/hubs 1.1.4.2 routers 1.1.4.3 ports 1.1.4.4 computers 1.1.4.5 Transmission media 1.1.5 Computer Network user requirements/needs 1.1.5.1 User requirements identification 1.1.5.2 User requirements analysis 1.1.5.3 User requirements documentation 1.2 Physical network design development 1.3 Logical network design development 1.4 Computer network design 1.4.1 Network design overview 1.4.2 Network design methodology 1.4.2.1 Hierarchical Network Design 1.4.2.2 Flat network	• Observation Checklist • Product Checklist • Written assessment • Portfolio of evidence

	1.4.3 Types of computer network sites (Green field and brownfield) 1.4.4 Network site preparation 1.4.4.1 Network floor plan design 1.4.4.2 Data and Access point 1.4.5 Implement the documented user requirements/needs 1.4.6 Fundamental Design Goals 1.4.6.1 Scalability 1.4.6.2 Availability 1.4.6.3 Security 1.4.6.4 Manageability	
2. Install computer network	2.1 Safety measures 2.1.1 Personal Protective Equipment (PPEs) 2.1.1.1 Overall/apron/dust coat 2.1.1.2 Antiglare screens 2.1.1.3 Dust mask 2.1.1.4 Gloves 2.1.1.5 Antistatic equipment 2.1.1.6 Ergonomics 2.1.1.7 First AID kit 2.1.2 Cable management 2.1.1.8 Proper routing 2.1.1.9 Labelling 2.1.3 Electrical safety 2.1.1.10 Use of insulated tools 2.1.1.11 Electrical equipment power ratings 2.1.4 Fire safety 2.1.1.12 Classes of fires	• Practical assessment • Project • Observation Checklist • Product Checklist • Written assessment • Portfolio of evidence

	2.1.1.13 Fire extinguishers 2.1.4 Emergency procedures 2.1.1.14 First AID kit 2.1.1.15 Emergency contact 2.1.1.16 Contingency measures 2.2 Computer network components identification 2.2.1 Considerations of network components identification 2.2.1.1 Switches/routers 2.2.1.2 Transmission media and connectors 2.2.1.3 Access points and wireless technology 2.2.1.4 Networking software and management tools 2.2.1.5 Network security devices 2.2.1.6 Servers and storage 2.2.2 Network Tools and materials assembly 2.2.2.1 Basic network tools 2.2.2.1.1 Cable crimpers 2.2.2.1.2 Cable strippers 2.2.2.1.3 Cutters, Scissors, screw drivers Pliers. 2.2.2.1.4 Cable Tie Tools. 2.2.2.1.5 Fiber Optic Tools. 2.2.2.1.6 Insertion - Extraction Tools. 2.2.2.1.7 Manual/Automatic Switch Boxes. 2.2.2.1.8 Network Testers.	

	2.2.2.1.9 Punch down Tools. 2.2.2.1.10 Tools usage and safety 2.2.2.1.11 Driver installers 2.2.2.1.12 Multimeter 2.2.2.1.13 Tone generator and probe 2.2.3 Computer Network materials 2.2.3.1 Network cables 2.2.3.2 Cable trunking covers 2.2.3.3 Connectors 2.2.3.4 RJ45 Sockets 2.2.3.5 Patch cords 2.2.3.6 Cable ties 2.3 Computer network set up 2.3.1 Network cabling and installation 2.3.1.1 Network design layout 2.3.1.2 Understanding cabling standards and codes 2.3.1.3 Cable termination and installation 2.3.1.4 Setting up wireless network devices 2.3.1.5 Network set up as per the design 2.3.1.6 Application of cable management best practices 2.4 Computer network devices configuration 2.4.1 Network models (TCP/IP, OSI) 2.4.2 Understanding IP Addressing 2.4.2.1 Classful IP Addressing 2.4.2.2 TCP/IP addressing 2.4.2.3 IPV4 and IPV6	

	2.4.2.4 IP Address Classes 2.4.2.5 Classless interdomain routing (CIDR-Subnetting) 2.4.2.6 Select IP addressing scheme (static vs. dynamic). 2.4.3 Basic switch and router configuration 2.4.3.1 Initial set up and configuration 2.4.3.2 Configuring interfaces and IP addresses 2.4.3.3 Setting up routing protocols (EIGRP, RIP and OSPF) 2.4.3.4 Configuring VLANs 2.4.3.5 Configuring access control lists 2.4.3.6 Implementing network address translation (NAT) and port address translation (PAT) 2.4.3.7 Implementing port security 2.4.3.8 Implementing spanning tree protocol (STP). 2.4.3.9 Configuration link aggregation (LACP) 2.4.4 Wireless access point configuration 2.4.4.1 Setting up access points (APs) 2.4.4.2 SSID, DHCP, DNS, SMTP 2.4.4.3 Configuring wireless security 2.4.4.4 Managing wireless network 2.4.4.5 Network Security configuration 2.4.4.6 Definition of Network privileges 2.4.4.7 Implement firewall and security policies	

	2.4.4.8 Types of Privileged Accounts 2.4.4.9 Network privileges are allocated according to the network configuration. 2.5 Computer network documentation 2.5.1 Define network documentation 2.5.2 Importance of network documentation 2.5.3 Types of network documentations 2.5.3.1 Physical, Logical and configuration 2.6 Computer network components disposal 2.6.1 Identify computer network waste 2.6.2 Classify computer network waste 2.6.2.1 E- waste 2.6.2.2 Hazards 2.6.2.3 Disposal methods 2.6.3 Legal regulation and compliance on waste disposal 2.6.3.1 Waste management act, 2022 2.6.3.2 EMCA act, 2015 on waste management 2.6.4 Disposal methods 2.6.4.1 The public procurement and assets disposal act, 2015	
3. Test computer network	3.1 Introduction to network testing 3.1.1 Importance of network testing 3.1.2 Network testing tools and equipment 2.6.4.2 Clamp meter 2.6.4.3 Voltmeter 2.6.4.4 Cable tester	• Practical assessment • Project • Observation Checklist

	2.6.4.5 Signal tester 2.6.4.6 Ping 2.6.4.7 Traceroute 2.6.4.8 Wireshark 3.2 Network components testing 3.2.1 Types of network testing 2.6.4.9 Performance 2.6.4.10 Functional 2.6.4.11 Security 3.2.2 Network testing procedures and standards 3.3 Network testing report 3.3.1 Importance of generating network test report 3.3.2 Components of a network test report 3.3.3 Presenting network test reports 2.6.4.12 Reports presentation techniques 2.6.4.13 Preparing interactive presentations	• Product Checklist • Written assessment • Portfolio of evidence
4. Perform computer network maintenance.	4.1 Computer network maintenance schedule 4.1.1 Importance of network maintenance 4.1.2 Preparation of maintenance schedule 4.1.3 Network troubleshooting process 4.1.4 Network troubleshooting techniques 4.2 Computer network Monitoring 4.2.1 Monitoring tools 4.2.1.1 Ping 4.2.1.2 Tracert 4.2.1.3 NSLookup 4.2.1.4 Ipconfig	• Practical assessment • Project • Observation Checklist • Product Checklist • Written assessment

	4.2.1.5 Speed test 4.2.1.6 Traceroute 4.2.1.7 Wireshark 4.2.2 Setting and configuring monitoring tools 4.2.3 Analysing network performance data 4.3 Computer network optimization 4.3.1 Network optimization techniques 4.3.2 Implementing quality of service (QOS) 4.4 Computer network maintenance report 4.4.1 Importance of generating network maintenance report 4.4.2 Components of a network maintenance report 4.4.3 Preparation of network maintenance report	• Portfolio of evidence

Suggested Delivery Methods

- Instructor led facilitation using active learning strategies
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Group discussions
- Direct instructions

Recommended Resources for 25Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Trainee: Item)

A	Learning Materials			
1.	Textbooks	For trainee's use	5 pcs	5:1
2.	Installation manuals	For trainers' use		
3.	Charts	For trainers' use		
4.	PowerPoint presentations	For trainer's use		
B	**Learning Facilities & infrastructure**			
5.	Lecture/theory room	For training	1	25:1
6.	Computer laboratory	For training	1	25:1
C	**Consumable materials**			
7.	5Printing papers	For printing	1 ream	1:20
8.	Toners	For printers	2 pcs	13:1
9.	Assorted colour of whiteboard markers	For trainer's use		
D	**Tools and Equipment**			
1.	Computers	For training	25 pcs	1:1
2.	Projector	For trainer's use	1 pc	25:1
3.	Signal testers	For training	5 pcs	5:1
4.	Header checker	For training	25 pcs	1:1
5.	Crimping tools	For training	25 pcs	1:1
6.	Cable tester	For training	5 pcs	5:1
7.	Punch Downs	For training	5 pcs	5:1

8.	Switches	For training	5pcs	5:1
9.	Repeaters	For training	5pcs	5:1
10.	Routers/modem	For training	5pcs	5:1
11.	Network tool kit	For training	25 pcs	1:1
12.	Gateways	For training	5pcs	5:1
13.	Packets of RJ45	For training	300 pcs	1:10
14.	Fibre Modules (SFP)	For training	5pcs	5:1
15.	UTP Ethernet Cable	For training	300 metres	1:10
16.	25 Antistatic gloves	For training	25 pairs	1:1