FEDERAL MINISTRY OF EDUCATION

National Technical Certificate (NTC) Curriculum in

NETWORKING AND SYSTEM SECURITY WORK CRAFT PRACTICE

February, 2025

Innovation Development and Effectiveness in the Acquisition of Skills (IDEAS) Project

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NATIONAL BOARD FOR TECHNICAL EDUCATION

Plot B, Bida Road, P.M.B. 2239, Kaduna, Nigeria

NATIONAL TECHNICAL CERTIFICATE

CURRICULUM AND MOUDULE SPECIFICATIONS IN

NETWORKING AND SYSTEM SECURITY WORK CRAFT PRACTICE

2025

GENERAL INFORMATION

AIM

To train and equip individuals with essential skills, fostering the development of competent professionals capable of thriving in the ICT sector as skilled craftsmen and self-sufficient entrepreneurs.

ENTRY QUALIFICATIONS

Craft Programme

Candidates must not be less than 14 years of age and should have successfully completed three years of Junior Secondary education or its equivalent. Special consideration may be given to sponsored candidates with lower academic qualifications who hold trade test certificates and are capable of benefiting from the programme.

The Curriculum

The Curriculum of each programme is broadly divided into three components:

1. General Education, which accounts for 30% of the total hours required for the programme.

2. Trade Theory, Trade Practice and Related Studies which account for 65% and,

3. Supervised Industrial Training/Work Experience which accounts for about 5% of the total hours required for the programme. This component of the course which may be taken in industry or in the College production unit is compulsory for the full-time students.

Included in the curriculum are the teacher's activity and learning resources required for the guidance of the teacher.

Unit Course/Modules

A course/ module is defined as a body of knowledge and skills capable of being utilized on its own or as a foundation or pre-requisite knowledge for more advanced work in the same or other fields of study. Each trade course/ module when successfully completed can be used for employment purposes.

Goal

This program is designed to provide trainees with a thorough understanding of computer systems, networking fundamentals, and advanced network security concepts, preparing them to design, implement, manage, and secure computer networks and systems, while ensuring compliance, governance, and risk management best practices.

Behavioural Objectives
These are educational objectives, which identify precisely the type of behaviour a student should exhibit at the end of a course/module or programme. Two types of behavioural objectives have been used in the curriculum. They are:

1. General Objectives
2. Specific Learning Outcomes

General objectives are concise, broad statements outlining the expected behaviors or outcomes of students upon completing a unit or week, such as understanding principles and their practical applications, to include:

1 To work as a network administrator
2 Design secure network architecture
3 Protect computer system and network from cyber threats
4 Troubleshoot network and security issues
5 Implement security protocols and technology

Specific learning outcomes are clear, detailed statements describing the precise behaviours, practical tasks, and related knowledge that students are expected to demonstrate as a result of the educational process. These outcomes serve as measurable indicators to ensure that the general objectives of a course or program have been achieved, providing a quantitative and focused expression of the skills and knowledge covered in a teaching unit.

General Education in Technical Colleges
The General Education component of the curriculum is designed to equip trainees with essential knowledge in key subjects such as English Language, Mathematics, Economics, Physics, Chemistry, and Entrepreneurial Studies, among others. This foundation enhances their skills of computer software and network tools, while also serving as a critical base for technical education, tailored for trainees.

National Certification

The National Technical Certificate (NTC) programmes are run by Technical Colleges accredited by N.B.T.E. NABTEB conducts the final national examination and awards certificates.

Trainees who successfully complete all the courses/ modules specified in the curriculum table and passed the National examinations in the trade will be awarded one of the following certificates:

S/NO	**LEVEL**	**CERTIFICATE**	
1	**Technical Programme**		
1.NTC National Technical Certificate			

Guidance Notes for Teacher implementing the Curriculum

The number of hours stated in the curriculum table may be increased or decreased to suit individual institutions' timetable provided the entire course content is properly covered and goals and objectives of each module are achieved at the end of the term.

The maximum duration of any module in the new scheme is 300 hours. This means that for a term of 15 weeks, the course should be offered for 20 hours a week. This can be scheduled in sessions of 4 hours in a day leaving the remaining hours for general education. However, if properly organized and there are adequate resources, most of these courses can be offered in two sessions a day, one in the morning and the other one in the afternoon. In doing so, some of these programmes may be completed in lesser number of years than at present.

The sessions of 4 hours include the trade theory and practice. It is left to the teacher to decide when the class should be held in the workshop or in a lecture room.

INTEGRATED APPROACH IN THE TEACHING OF TRADE

Theory, Trade Science and Trade Calculation

The traditional approach of teaching trade science and trade calculation as separate and distinct subjects in Technical College programmes is not relevant to the new programme as it will amount to a duplication of the teaching of mathematics and physical science subjects in the course. The basic concepts and principles in mathematics and physical science are the same as in the trade calculation and trade science. In the new scheme therefore, qualified persons in these fields will teach mathematics and physical science and the instructors will apply the principles and concepts in solving trade science and calculation problems in the trade theory classes. To this end, efforts have been made to ensure that mathematics and science modules required to be able to solve technical problems were taken as pre-requisite

Evaluation of Programme/Module

For the programme to achieve its objectives, any course started at the beginning of a term must terminate at the end of the term.

Instructors should therefore device methods of accurately assessing the trainees to enable them give the student's final grades at the end of the term. A national examination will be taken by all students who have successfully completed their modules. The final award will be based on the aggregate of the scores attained in the course work and the national examination.

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SECURITY

GOAL: The Networking and System Security Programme aims to produce skilled network administrators capable of designing and implementing secure network architectures, safeguarding computer systems and networks against cyber threats, troubleshooting network and security challenges, and deploying security protocols and technologies.

OBJECTIVE:

1. The learners should be able to know and apply occupational health and safety in computer networking.
2. The learners should be able to work with other team members.
3. The learners should be able to apply the concept of computer networking.
4. The learners should be able to identify networking components.
5. Setup and configure a Small office and Medium Office (SOHO).

Contents

CURRICULUM TABLE AND COURSE HOURS/WEEK
PROGRAMME: NATIONAL TECHNICAL CERTIFICATE

Module Code	MODULE TILTLE	YEAR I						YEAR 2						YEAR 3						TOTAL HOURS
		Term 1		Term 2		Term 3		Term 1		Term 2		Term3		Term 1		Term 2		Term 3		
		T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	
CAM 12 - 15	Mathematics	2		2		2		2		2		2		2		2		2		216
CEN 11 - 17	English	2		2		2		3		3		3		3		3		3		288
CPH 10 - 12	Physics	2		2		2		1	2	1	2	1	2	1	2	1	2	1	2	288
CCH 10 - 12	Chemistry	2		2		2		1	2	1	2	1	2	1	2	1	2	1	2	288
CEC 11 - 13	Economics	2		2		2		2		2		2		2		2		2		216
CBM 11	Entrepreneurship													2		2		2		72
ICT 11 - 15	Computer Studies							1	2	1	2	1	2	1	2	1	2			180
CNS 111	Introduction to Computer System	**1**	**3**																	48
CNS 112	Introduction to Computer Network and Infrastructure	**1**	**2**																	36
CNS 113	Health and Safety in Computer Network	**1**	**2**																	36
CNS 121	Introduction to Computer Hardware and Software			**2**	**3**															60
CNS 122	IP Addressing & Subnetting			**2**	**3**															60
CNS 131	Introduction to network Security					**2**	**3**													60
CNS 132	Wireless Network Communication					**2**	**3**													60

CNS 211	Network Security Methodologies							**2**	**3**											60
CNS 212	Network Communication Models – OSI & TCP/IP							**2**	**3**											60
CNS 221	Network Security Management									**2**	**3**									60
CNS 222	Network Optimization									**2**	**3**									60
CNS 231	Cloud and IoT Security											**2**	**3**							60
CNS 232	SIWES																			
CNS 311	Cloud Networking													**2**	**3**					60
CNS 312	Network Security and Threat Intelligence													**2**	**3**					60
CNS 321	Network Security Governance and Compliance															2	3			60
CNS 322	Network Security Risk Management and Incident Response															2	3			60
CNS 331	Firewall Technologies																	2	3	60
CNS332	Network Design and Media Configuration																	2	3	60

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY				
MODULE: Introduction to Computer System			**SUBJECT CODE: CNS 111**	**CONTACT HOURS: 48**
YEAR: 1	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical: 12** Hours **Practical: 36** Hours	
GOAL: This module is designed to equip the trainee with knowledge and skills of computer system				
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Know the history of computer system 2.0 Understand computer system architecture 3.0 Understand computer system performance 4.0 Understand computer system security				

MODULE: Introduction to computer system			**COURSE CODE: CNS111**	**CONTACT HOURS: 48**
YEAR: 1	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical: 12** Hours **Practical: 36** Hours	
GOAL: This module is designed to equip the learner with the basic knowledge, identification and skills of computer system				
Theoretical Content			**Practical Content**	
GENERAL OBJECTIVE 1.0: KNOW THE HISTORY OF COMPUTER SYSTEM				

Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-3	1.1 Explain computer system 1.2 State evolution of computer system	Explain computer and computer system	Printed Charts, Projector, Whiteboard, Computer, YouTube	Identify computer system	Guide learners to Identify computer system	Computer system and its peripherals

	1.3 Classify computers according to their generation 1.4 Outline the components of computer system 1.5 Distinguish between analog, digital and hybrid computers	Discuss the history of computer system Explain the types and classes of computers Explain the components of computer system Differentiate between analog, digital and hybrid computers	Videos, Internet, Notes, Textbook	Show the different components of computer system	Guide learners to identify different components of computer system	Desktop computer, laptop computer, saver computer, mobile devices
2 **GENERAL OBJECTIVE 2.0:** UNDERSTAND COMPUTER SYSTEM ARCHITECTURE						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4-6	1.1 Explain computer system architecture 1.2 State Computer System Architecture Layers 1.3 Identify Computer System Architecture Design Considerations 1.4 Discuss Computer System Architecture Example	Explain computer system architecture Discuss Computer System Architecture Layers Discuss Computer System Architecture Design Consideration. Explain different Computer System	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook			

		Architecture Examples				
GENERAL OBJECTIVE 3.0: UNDERSTAND COMPUTER SYSTEM PERFORMANCE						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-9	1.1 Define computer system performance 1.2 State Performance Optimization Techniques 1.3 List Performance Monitoring Tools 1.4 Identify computer system Performance Challenges	Explain computer system performance Discuss the optimization techniques for system performance Discuss different Performance Monitoring Tools Discuss performance challenges	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Use the performance monitoring tools to monitor system performance Monitor network Performance using performance monitoring tools	Guide learners to identify Performance Monitoring Tools and its uses Guide learners to use performance monitoring tool to monitor Performance	
GENERAL OBJECTIVE 4.0: UNDERSTAND COMPUTER SYSTEM SECURITY						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10-12	1.1 Explain computer system security 1.2 Identify Security Threats	Discuss computer system security	Printed Charts, Projector, Whiteboard, Computer,			

	1.3 Outline Security Measures 1.4 Explain security Best Practices	Explain different Security Threat Explain common Security Measures Explain different security Best Practices	YouTube Videos, Internet, Notes, Textbook			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY				
MODULE: INTRODUCTION TO COMPUTER NETWORK AND INFRASTRUCTURE			**COURSE CODE: CNS112**	**CONTACT HOURS: 36**
YEAR: 1	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical: 12** Hours **Practical: 24** Hours	
GOAL: This module is designed to provide trainees with the basic concept of computer network and infrastructure				
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Understand the concept of computer network 2.0 Identify different types of network devices 3.0 Understand Network Protocols				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: INTRODUCTION TO COMPUTER NETWORK AND INFRASTRUCTURE				**COURSE CODE: CNS112**		**CONTACT HOURS: 36**
YEAR: 1	**TERM:** 1	**PRE: REQUISITE:**		**Theoretical: 12** Hours **Practical: 24** Hours		
GOAL: This module is designed to provide trainees with the basic concept of networking						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: UNDERSTAND THE CONCEPT OF COMPUTER NETWORK						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain computer network	Define computer network and explain the concepts of	Printed Charts, Projector, Whiteboard,			

	1.2 State the advantages and disadvantages of a computer network 1.3 List uses of computer network 1.4 Identify resources shared on a network 1.5 Identify the types of networks 1.6 Differentiate between LAN, MAN and WAN 1.7 List examples of LAN, MAN and WAN	internet, intranet and extranet Explain the uses of computer network Outline the resources that can be shared on a network Explain types of networks; LAN, MAN, WAN	Computer, YouTube Videos, Internet, Notes, Textbook			
3 **GENERAL OBJECTIVE 2.0:** IDENTIFY DIFFERENT TYPES OF NETWORK DEVICES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-8	2.1 Explain end devices 2.2 List the uses of end devices 2.3 List examples of end devices 2.4 Describe intermediary devices 2.5 List the uses of intermediary devices	Explain end devices Explain the uses of end devices Give examples of end devices Explain intermediary device	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Identify and name end Devices Identify and name intermediary devices	Guide learners to identify and name end devices Guide learners to identify and name	Computer, Printer, Switch, Router, Server computer, Repeaters

	2.6 List examples of intermediary devices	Explain the uses of intermediary devices Give examples of intermediary devices			intermediary devices	
4 **GENERAL OBJECTIVE 4.0:** UNDERSTAND NETWORK PROTOCOLS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	4.1 Explain network protocols 4.2 Identify the importance of network protocol 4.3 List common network protocol	Explain network protocol Explain the importance of network protocols explain the common network protocols	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Demonstrate logging onto a computer and browse the internet using an internet browser application. Demonstrate opening/creating an email address on an email server	Guide the students to browse on the internet Guide the student to send email messages to some one	Computers with internet access

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY			
MODULE: Health and Safety in Computer Network		**COURSE CODE: CNS 113**	**CONTACT HOURS: 36**
YEAR: 1	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 12** Hours **Practical: 24** Hours
GOAL: This module is designed to introduce the trainee with the knowledge of health and safety in a computer network			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Understand safety in computer network 2.0 Understand hazards associated with computer network 3.0 Understand safety precautions and Procedures in computer network 4.0 Know Health and Safety Regulations and Standard			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY			
MODULE: Safety in Computer Network		**COURSE CODE: 113**	**CONTACT HOURS: 36**
YEAR: 1	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 12** Hours **Practical: 24** Hours
GOAL: This module is designed to introduce the trainee with the knowledge of safety in a computer network			

	Theoretical Content			**Practical Content**		
GENERAL OBJECTIVE 1.0: UNDERSTAND SAFETY IN COMPUTER NETWORKING						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-3	1.1 Explain Safety. 1.2 Describe Safety in a computer Network	Explain Safety in Network Explain the need for Safety in computer	Printed Charts, Projector, Whiteboard, Computer, YouTube	Perform safety checks on Computer network. Demonstrate the	Guide Learners to Perform safety checks on Computer network.	Computer health check software applications.

	1.3 Explain the need for Safety in computer network 1.4 List the steps involved in performing safety checks in a computer network.	network Describe the steps involved in performing safety checks in a computer network.	Videos, Internet, Notes, Textbook	steps involved in performing safety checks in a computer network.	Guide the learners to demonstrate the steps involved in performing health and safety in a computer network.	
GENERAL OBJECTIVE 2.0: UNDERSTAND HAZARDS ASSOCIATED WITH COMPUTER NETWORK						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4-6	2.1 Explain Hazards 2.2 Explain Hazards in a computer network 2.3 Identify hazards associated with computer network. 2.4 List the causes of Hazards associated with computer network. 2.5 Mention the consequences of Hazards associated with computer network. 2.6 Mention the Importance of Hazard Identification and Risk Assessment	Explain Hazards Explain Hazards in a computer network. Explain hazards associated with computer network. Explain the Hazards associated with a network and computer. Describe the consequences of	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Identify potential hazards in network and computer lab/room.	Guide learners to Identify potential hazards in network and computer lab/room.	LAN, Computers

		Hazards associated with computer network. Describe the importance of Hazards associated with computer network.				
GENERAL OBJECTIVE 3.0: UNDERSTAND SAFETY PRECAUTIONS IN COMPUTER NETWORK						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
6-9	1.1 Explain Safety 1.2 Explain Safety Precautions in a computer network 1.3 List the types of safety precautions in a computer network 1.4 Mention the importance of safety precautions in computer network. 1.5 Describe the need to be safety conscious while working on a computer network. 1.6 Explain the following terms; i. safety wears (PPE) ii. safety gadgets	Explain Safety Explain Safety Precautions in a computer network Identify the types of safety precautions in a computer network Explain the importance of safety precautions in a computer network. Discuss the need to be safety conscious while working on a computer network.	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Identify safety precautions in a computer network	Guide Learners to identify safety precautions in computer networks.	LAN, Computer, cable cutters, crimping tools

	iii safety tools and equipment	Explain the following terms; i. safety wears (PPE) ii. safety gadgets iii safety tools and equipment				
GENERAL OBJECTIVE 4.0: KNOW HEALTH AND SAFETY REGULATIONS AND STANDARDS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10-12	1.1 Explain Safety Regulations 1.2 Explain Standards of networking 1.3 Explain standards associated to networking 1.4 Identify regulatory bodies associated to development of networking standards and regulations	Explain safety regulations Explain standards of networking Describe Standards associated networking. Describe the common safety standards and regulations in a computer network	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY			
MODULE: INTRODUCTION TO COMPUTER HARDWARE AND SOFTWARE		**COURSE CODE: CNS 121**	**CONTACT HOURS: 60**
YEAR: 1	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours
GOAL: This course is designed to provide the trainee with the skill knowledge of computer hardware and software.			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Know the fundamental of computer hardware and software 2.0 Troubleshoot software issues 3.0 Carry out basic computer hardware maintenance			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: INTRODUCTION TO COMPUTER HARDWARE AND SOFTWARE				**COURSE CODE: CNS121**		**CONTACT HOURS: 60**
YEAR: 1	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to equip the learner with knowledge of computer hardware and software, skills to troubleshoot computer system and maintenance of computer hardware						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: KNOW THE FUNDAMENTAL OF COMPUTER HARDWARE AND SOFTWARE						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Define Computer Hardware 1.2 Define computer software	Explain computer Hardware Explain computer software	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos,	Identify computer hardware. Identify computer software	Guide learners to Identify computer hardware	Computers (Desktop/Laptop),

	1.3 Distinguish between computer hardware and software 1.4 List the types of computer systems 1.5 List types of computer Hardware 1.6 List types of computer software 1.7 Explain the components of computer hardware 1.8 Explain the component of computer software 1.9 Explain the process Involved in software installation 1.10 Explain computer system peripherals 1.11 list the different types of computer peripherals: I. Input Devices	Explain the relationship between computer hardware and software. Outline the types of computer systems Outline types of computer hardware Outline types of computer software Explain the components of computer Explain Components of computer hardware Explain the components of computer software Explain types of computer Hardware components Explain types of computer software components Describe the process of computer hardware maintenance.	Internet, Notes, Textbook	Identify Input Devices, Output Devices, Storage devices, Networking devices Demonstrate how to Install operating systems and application software	Guide learners to identify computer software. Guide learners to identify computer hardware and software components Guide learners to install operating systems Guide learners to configure application software Guide learners to demonstrate the process of computer hardware installation and maintenance Guide learners to	Windows Operating system CPU, Memory (Ram), Hard drive, monitor. Keyboard, mouse, CD, projector, switch, router, modem, printer webcam etc.

	II. Output Devices III. Storage devices IV. Networking devices 1.12 Mention the Functions of computer peripherals 1.13 List Importance of computer peripherals	Describe the process to carry out computer software installation Explain computer peripherals Identify and discuss types of computer peripherals			Demonstrate how to Install operating systems and application software. Guide learners to identify; Input Devices, Output Devices, Storage devices, Networking devices.	
GENERAL OBJECTIVE 2.0: TROUBLESHOOT SOFTWARE ISSUES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-8	2.1 Define troubleshooting 2.2 List the types of troubleshooting 2.3 Outline the importance of troubleshooting 2.4 List different types of troubleshooting tools	Explain troubleshooting Explain the types of troubleshooting Explain the importance of troubleshooting Explain the types of troubleshooting tools	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Perform computer troubleshooting	Guide learners to Perform computer troubleshooting	Computer system

	2.5 List different types of troubleshooting techniques 2.6 Outline the steps carried out in troubleshooting a software	Explain the different troubleshooting techniques Describe troubleshooting steps				
GENERAL OBJECTIVE 3.0: CARRY OUT BASIC COMPUTER HARDWARE MAINTENANCE						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	2.1 Define preventive maintenance 2.2 Explain corrective maintenance 2.3 State preventive maintenance and its importance 2.4 Explain corrective maintenance and its importance. 2.5 Explain hard drive preparation 2.6 Explain system requirements for installation 2.7 Explain background procedures used for system installation	Explain corrective maintenance and its importance. Demonstrate how to carry out corrective maintenance with its tool Explain hard drive preparation Explain system requirements for installation Explain background procedures used for system installation	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Carry out preventive maintenance on hardware devices Verify and test the source of voltage/current.	Guide learners to carry out preventive hardware maintenance Guide learners to demonstrate voltage/current source in a circuit and test to verify the electric theory	Multimeter, voltmeter, cover jacket, blower

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY</td></tr>
<tr><td colspan="2">MODULE: INTRODUCTION TO IP ADDRESSING & SUBNETTING</td><td>SUBJECT CODE: CNS 122</td><td>CONTACT HOURS: 60</td></tr>
<tr><td>YEAR: 1</td><td>TERM: 3</td><td>PRE: REQUISITE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This module is designed to introduce the trainee to the basic knowledge of IP addressing and subnetting, to provide trainees with a comprehensive understanding of IP addressing schemes and subnetting techniques. By mastering these foundational networking concepts</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1.0 Understanding IPv4 Sub-netting Fundamentals
2.0 Understand the IPv4 Sub-netting II
3.0 Understand Classless Inter-Domain Routing (CIDR)
4.0 Understand Variable Length Subnet Masking (VLSM)
5.0 Understand IPv6 Addressing and Sub-netting
6.0 Apply practically IP Addressing and Sub-netting</td></tr>
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PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: IP ADDRESSING & SUBNETTING				**COURSE CODE: CNS 122**		**CONTACT HOURS: 60**
YEAR: 1	**TERM: 1**	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to introduce the trainee to the basic knowledge of IP addressing and subnetting, to provide learners with a comprehensive understanding of IP addressing schemes and subnetting techniques.						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: UNDERSTANDING IPV4 SUB-NETTING FUNDAMENTALS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Define subnetting 1.2 State the importance of subnetting 1.3 Understand the Subnet Mask 1.4 Identify the Host Portions of an IP Address 1.5 Identify Network portion of an IP address	Explain subnetting. Discuss the importance of subnetting Explain subnet mask Describe the host portion of the IP address Describe the network portion of the IP address Explain broadcast	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			Cisco Netacad.com Skill4all.com Internet Projector Laptop Packet Tracer

	1.5 Identify Broadcast Address and Range of Usable IP Addresses 1.5 Understand Fixed-Length Subnetting (FLSM) Basics	address and Range of usable IP addresses Explain Fixed-Length Subnetting (FLSM) Basics FLSM				
GENERAL OBJECTIVE 2.0: UNDERSTAND THE IPV4 SUBNETTING II						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	2.1 Subnet block Class A, B, and C IP Networks 2.2 Convert Binary to decimal 2.3 Convert decimal to binary 2.4 Identify usable host IPs per Subnet 2.5 Troubleshooting Common Subnetting Errors	Explain how to subnet a block of IPs for class A, B, C Demonstrate conversion from binary to decimal Demonstrate conversion of decimal to binary	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator	Assign IP Address to device Create subnets with Different Network Sizes	Guide the learners to assign IP address to devices Guide learners to create subnets with different size of network	

		Explain usable host IPs per subnet Explain how to troubleshoot subnetting errors				
GENERAL OBJECTIVE 3.0: Understand Classless Inter-Domain Routing (CIDR)						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-6	3.1 Define CIDR and Its Benefits 3.2 Identify CIDR Notation and Prefix Lengths (e.g., /8, /16, /24) 3.3 Design Efficient IP Plans Using CIDR 3.4 Use CIDR Cases in Modern Networks 3.5 Real-World Network Design Scenarios	Explain the CIDR and give its benefits Explain CIDR Notation and Prefix Lengths (e.g., /8, /16, /24) Discuss how to design an IP Plan Discuss the use Case of CIDR in modern networks Discuss real world scenarios	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator	Perform CIDR Address Aggregation and Route Summarization	Demonstrate CIDR Address aggregation and route summarization	

		in network design				
GENERAL OBJECTIVE 4.0: Understand Variable Length Subnet Masking (VLSM)						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	4.1 Define VLSM 4.2 Outline the benefits of VLSM for Efficient IP Allocation 4.3 Identify some real-world examples of VLSM Implementation 4.4 Understand CIDR and VLSM Practice Labs	Explain the VLSM in full Explain the Benefits of VLSM for efficient IP allocation Outline some real-world examples of VLSM	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator	Implement VLSM Use VLSM for Network Segmentation and Scalability Perform CIDR and VLSM Practice Labs Perform CIDR & VLSM activity in packet trace	Demonstrate how to implement VLSM Demonstrate the use of VLSM in sub-netting Guide the learners to Perform CIDR & VLSM activity in packet tracer	
GENERAL OBJECTIVE 5.0: Understand IPv6 Addressing and Subnetting						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-10	5.1 Explain of IPv6 5.2 Identify the features of IPv6	Discuss the IPv6 address Explain the features of IPv6	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook			

	5.3 Identify the structure of IPv6 Addresses 5.4 Outline the type of IPv6 Addresses (Unicast, Multicast, Anycast) 5.5 Identify IPv6 Prefixes and Subnetting 5.6 Explain the transition mechanisms from IPv4 to IPv6	Explain the structure of IPv6 Address Explain the types of IPv6 addresses Explain the prefix of IPv6 Discuss the need for the IPv6 address	Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator			
	GENERAL OBJECTIVE 6.0: Practical Applications of IP Addressing and Subnetting					
	Specific Learning Outcome	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	6.1 Design an IP Address Scheme for Small to Medium Networks 6.2 Manage IP Address 6.3 Securing IP	Discuss the scheme used to determine the IP address for a small/medium network Explain the use IP Address	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com	Troubleshoot IP Addressing and Subnetting Issues Perform subnet calculations using Online/offline	Guide the learners to Explain the steps to troubleshoot IP address issues Demonstrate how to perform subnet calculation using	Cisco Netacad.com Skill4all.com Internet Projector Laptop

	Address Allocation Plans **6.4** Configure IP address	Management (IPAM) Explain how to secure IP addresses	Packet Tracer Subnet Calculator	subnet calculators and Tools Demonstrate how to configure IP address	online/offline subnet calculators **Guide learners to configure IP address**	Packet Tracer Subnet Calculator

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN</td></tr>
<tr><td colspan="2">MODULE: Introduction to network Security</td><td>COURSE CODE: CNS 131</td><td>CONTACT HOURS: 60</td></tr>
<tr><td>YEAR: 1</td><td>TERM: 3</td><td>PRE: REQUISITE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This course is designed to provide the trainee with the basic knowledge in network Security Measures</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES:
On completion of this module, the trainee should be able to:
1.0 Understand network security and threats
2.0 Understand how to Encrypt and decrypt files
3.0 Understand network fundamentals
4.0 Understand firewalls and access control lists
5.0 Understand Virtual Private Networks (VPN)
6.0 Understand encryption technologies
7.0 Understand intrusion detection and prevention systems
8.0 Understand SDN, NFV, 5G
9.0 Understand Network segmentation
10.0Understand Access control</td></tr>
</table>

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: Introduction to network Security				**COURSE CODE: CNS 131**		**CONTACT HOURS: 60**
YEAR: 1	**TERM:** 3	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to provide the trainee with knowledge in network security						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understand network security and threats						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1	1.1 Define network security 1.2 Explain threats and vulnerabilities of a computer network 1.3 List the various types of threats and vulnerabilities associated to a network 1.4 Outline security measures of a network 1.5 Identify ways of protecting a network against an incoming threat	Explain network security measures Explain threats and vulnerabilities of a computer network Explain the various types of threats and vulnerabilitie s of a network Explain ways of protecting a network against an incoming threat	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Carry out network security exercise Carryout a network security measure against an incoming threat	Guide learners to Carry out network security exercise Guide learners to Carryout a network security measure against a threat	Internet connection, Projector, Computer, VPN

GENERAL OBJECTIVE 2.0: Understand encryption and decryption						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
2	2.1 Explain encryption 2.2 Explain decryption 2.3 Mention forms of encryption and decryption 2.4 Explain encryption algorithms 2.5 Explain decryption algorithms 2.6 List the common errors in encryption and decryption	Explain encryption Explain decryption Describe forms of encryption and decryption Explain encryption algorithms Define decryption algorithms Explain and discuss the common errors in encryption and decryption	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Encrypt and decrypt a simple network	Guide learners to Encrypt and decrypt a simple network	Internet connection, Projector, Computer, VPN

GENERAL OBJECTIVE 3.0: understand network fundamentals						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3	3.1 Explain LAN (Local Area Network) and WAN (Wide Area Network) 3.2 Explain the terms used in a network, including: - Client - Server - Router - Gateway 3.3 Describe the importance of a network 3.4 Identify the types of cables used in LAN and WAN (e.g. Cat 5e) 3.5 Identify the types of connectors used in LAN and WAN 3.6 Explain the functions of Router and Gateway 3.7 List the different types of network devices	Explain the fundamentals of a network Identify types of networks Discuss importance of network fundamentals Explain the types of cables Explain the types of connectors used in LAN and WAN Explain the functions of Router and Gateway Outline the different types of network devices	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator	Setup small network using routers and switches Configure Ip addresses and subnet masks Carry out a network plan design on board and NIC installation	Guide learners to Setup small network using routers and switches Guide learners to Configure Ip addresses and subnet masks Guide students on how to plan and design a network	Internet, Projector, Laptop, VPN, Routers, switches, network cables

	3.8 Explain the difference between Router and Gateway 3.9 Explain the difference between LAN and WAN 3.10 Describe the advantages of WAN over LAN 3.11 State the advantages and disadvantages of a network of WAN over LAN	Explain the difference between Router and Gateway Explain the difference between LAN and WAN State the Advantages and disadvantages of WAN over LAN				

Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 4.0: Understand firewalls and access control lists						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4	4.1 Explain firewalls 4.2 Explain access control 4.3 List the types of firewalls and their uses 4.4 Mention the uses of firewall	Explain firewalls Explain access control Discuss the types of firewalls and their uses	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Configure a firewall to allow HTTP traffic and block incoming FTP traffic.	Guide the learners to Configure a firewall to allow HTTP traffic and block incoming FTP traffic	A computer with a firewall software installed e.g. windows defender, a web browser, an FTP client

	4.5 List the benefits of using a firewall 4.6 List the types of Access control 4.7 Mention access control models 4.8 List the benefits of firewalls and access controls	Discuss the uses of firewall Discuss the benefits of using a firewall Discuss the types of Access control Discuss access control models Discuss the benefits of firewalls and access controls		Configure access control to allow a specific user to access a shared folder	Guide the learners to Configure access control to allow a specific user to access a shared folder	(eg FileZilla). A computer with shared folder. A user account with admin privilege, a user account with limited privilege
GENERAL OBJECTIVE 5.0: UNDERSTAND VIRTUAL PRIVATE NETWORKS (VPN)						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5	5.1 Explain Virtual Private Networks (VPN) 5.2 List the types of VPN 5.3 Mention the benefits of VPN 5.4 List VPN protocols	Explain VPN Identify the types of VPN Discuss the benefits of VPN Identify VPN	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Set up a VPN connection using VPN client and connect a VPN server	Guide the learners to Set up a VPN connection using VPN client and connect a VPN server	A computer with internet access. A VPN client software A VPN

	5.5 List the steps of how a VPN works	Protocols Discuss the steps of how a VPN works				server address and credentials
GENERAL OBJECTIVE 6.0: UNDERSTAND ENCRYPTION TECHNOLOGIES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
6	6.1Explain the brief history of encryption 6.2 Explain Encryption and decryption 6.3 List Types of Encryption 6.4 List the Benefits of Encryption 6.5 List the importance of encryption 6.6 State the steps of encryption	Explain the overview of encryption Explain the definition of encryption Explain the Types of Encryption Discuss the benefits of Encryption Discuss the importance of encryption Identify and discuss the steps of encryption	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Demonstrate the process of Encrypting a file with open SSL	Demonstrate and guide learners to Encrypt a file with open SSL	Computer, OpenSSL application software text system application software

GENERAL OBJECTIVE 7.0: Understand intrusion detection and prevention systems						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7	7.1 Explain intrusion detection system 7.2 Explain intrusion prevention system 7.3 List the key features of IDPS 7.4 List the types of IDPS 7.5 Mention the benefits of IDPS 7.6 List the common IDPS Techniques 7.7 State the steps of implementing IDPS.	Explain intrusion detection system Explain intrusion prevention system Outline the key features of IDPS Outline the types of IDPS Discuss the benefits of IDPS Explain the common IDPS Techniques Discuss the steps of implementing IDPS.	I Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Demonstrate downloading, installing and configuring snort Demonstrate setting up a network based ISDPS	Guide the learners to Demonstrate downloading installing and configuring snort Guide the learners to Demonstrate setting up a network based ISDPS	Snort tool, virtual machine or test network, SQL injections

GENERAL OBJECTIVE 8.0: UNDERSTAND SDN, NFV, 5G						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
8	8.1 Define Software Defined Network (SDN) 8.2 Define Network Function Virtualization (NFV) 8.3 Define Fifth Generation (5G) 8.4 List key components of SDN, NFV and 5G 8.5 Mention the benefits of SDN, NFV and 5G 8.6 Mention the uses of SDN, NFV and 5G 8.7 Discuss the relationship between SDN, NFV and 5G 8.8 List the key technologies and standards of SDN, NFV and 5G	Explain SDN, NFV & 5G Explain key components of SDN, NFV and 5G Discuss the benefits of SDN, NFV and 5G Discuss the uses of SDN, NFV and 5G Discuss the relationship between SDN, NFV and 5G Identify the key technologies and standards of SDN, NFV and 5G	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Demonstrate installing an SDN controller and experiment with its features. Demonstrate testing a 5G performance	Guide learners to install an SDN controller and experiment with its features Guide learners to test a 5G performance	Open Day light: an SDN controller IPERF or QE MU

GENERAL OBJECTIVE 9.0: UNDERSTAND NETWORK SEGMENTATION						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9	9.1 Define network segmentation 9.2 List the Importance of network segmentation 9.3 List types of network segmentation 9.4 Outline the benefits of network segmentation	Explain network segmentation Identify the Importance of network segmentation Explain types of network segmentation Discuss the actions of network segmentation	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Configure VLANs with Cisco packet tracer	Demonstrate the Configuration n of VLANs with Cisco packet tracer	Cisco packet tracer Computer system Switch or more devices
GENERAL OBJECTIVE 10 .0: UNDERSTAND ACCESS CONTROL						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10	10.1 Explain Access Control 10.2 List types of access control 10.3 Explain access control models	Explain Access Control Explain the types of Access Control Explain access	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com	Configure access control lists (ACLs) with Cisco IOS	Demonstrate the Configuration of access control lists (ACLs) with Cisco IOS	Cisco IOS Virtual machine Device

	10.4 List types of access control models 10.5 Explain access control components 10.6 List types of access control components 10.7 Explain access control techniques 10.8 List access control techniques 10.9 Mention the benefits of access control 10.10 Mention the steps of implementing access control	control models Identify the types of access control models Explain access control components Identify the types of access control components Explain access control techniques Discuss and identify access control techniques Discuss the benefits of access control Discuss the steps of implementing access control	Skill4all.com Packet Tracer			

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY</td></tr>
<tr><td colspan="2">MODULE: Wireless Network Communication</td><td>COURSE CODE: CNS 132</td><td>CONTACT HOURS: 60</td></tr>
<tr><td>YEAR: 1</td><td>TERM: 3</td><td>RE: REQUISITE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This module is designed to introduce the trainee to the basic knowledge on wireless networks, equip the learners with the skills to be able to design, implement, secure, and troubleshoot wireless communication and networking systems across various environments using best practices and modern technologies.</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES:
On completion of this module, the trainee should be able to:
1.0 Understand security research and development methodologies
2.0 Understand Wireless Communication Technologies
3.0 Understand Wireless Network Architecture
4.0 Understand Wireless Security
5.0 Understand Wireless Standards and Protocols
6.0 Implement Wireless Network Troubleshooting and Optimization</td></tr>
</table>

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: Wireless Network Communication				**COURSE CODE: CNS 132**		**CONTACT HOURS: 60**
YEAR: 1	**TERM:** 3	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to introduce the trainee to the basic knowledge on wireless networks, equip the learners with skills to be able to design implement, secure, and troubleshoot wireless communication and networking systems across various environments using best practices and modern technologies.						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: UNDERSTAND SECURITY RESEARCH AND DEVELOPMENT METHODOLOGIES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Understand the History and Evolution of Wireless Communication 1.2 Differentiate the Types of Wireless Networks (PAN, LAN, MAN, WAN) 1.3 Understand the Wireless Communication Principles 1.4 Outline the	Discuss the evolution of wireless communication Explain the different types of wireless networks Explain the wireless communication principles Discuss the advantages of wireless networks	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator Wireless router			

	advantages of Wireless Networks 1.5 Outline the challenges of wireless networks 1.6 Identify the Wireless Standards	Discuss the challenges of wireless networks Explain the Wireless Standards **(IEEE 802.11, 802.15, 802.16)**				
GENERAL OBJECTIVE 2.0: UNDERSTAND WIRELESS COMMUNICATION TECHNOLOGIES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	2.1 Explain Radio Frequency (RF) 2.2 Explain Electromagnetic Spectrum 2.3 Differentiate different cellular Networks 2.4 Explain Wi-Fi Technologies (802.11a/b/g/n/ac/ax) 2.5 Explain Bluetooth	Explain the radio frequency Explain electromagnetism Explain the various cellular technologies **(2G, 3G, 4G, 5G)** Discuss the different wifi technologies				

	and Near Field Communication (NFC) 2.6 Explain Satellite Communication 2.7 Wireless Technologies and IoT	Explain the Bluetooth and NFC devices Explain satellite communication Explain wireless technologies **(LoRa, Zigbee)**				
GENERAL OBJECTIVE 3.0: Understand Wireless Network Architecture						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-6	3.1 Identify Wireless Network Components (Access Points, Controllers, Clients) 3.2 Describe the Wireless Transmission Methods (Spread Spectrum, OFDM, MIMO) 3.3 Explain WLAN Topologies	List the wireless network components Demonstrate the wireless transmission methods Discuss the WLAN Topologies **(**Ad-Hoc, Infrastructure**,** Mesh**)**	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator Wireless router	Carry out Site Surveys and Coverage Mapping	Guide the learners to carry out site servers and coverage mapping	

	3.4 Identify Wireless Network Planning and Design Considerations	Outline the elements required for the wireless network planning and design				
GENERAL OBJECTIVE 4.0: UNDERSTAND WIRELESS SECURITY						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	4.1 Explain Wireless Network Security 4.2 Explain wireless network Threats and Vulnerabilities 3.2 Explain different authentication method 3.3 Explain different Encryption Methods 3.4 Explain wireless Intrusion 3.5 Identify wireless Intrusion detection and prevention Systems	Explain wireless network security Explain wireless network threats and vulnerabilities Discuss different authentication methods including AAA Discuss different authentication method (WPA2, WPA3, 802.1X) Explain wireless intrusion	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator Wireless router	Secure a Wireless Access Points	Guide learners to secure wireless access points	Cisco Netacad.com Skill4all.com Internet Projector Laptop Packet Tracer Subnet Calculator Wireless router

	3.6 Describe the best practice to secure a wireless network	Outline the wireless intrusion detection and prevention systems (WIDS/WIPS) Discuss the best practice of wireless network				

GENERAL OBJECTIVE 5.0: UNDERSTAND WIRELESS STANDARDS AND PROTOCOLS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-10	5.1 Define IEEE 802.11 Standards 5.2 Define Wi-Fi Alliance Certifications 5.3 Explain Bluetooth Protocol and Versions 5.4 Explain Network Standards	Explain the IEEE Standards Explain alliance certification in wifi Discuss Bluetooth protocols versions Explain the different cellular network standards (LTE, 5G NR)	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator Wireless router			

	5.5 Explain wireless Interference and Coexistence	Explain the wireless interference and coexistence				
GENERAL OBJECTIVE 6.0: IMPLEMENT WIRELESS NETWORK TROUBLESHOOTING AND OPTIMIZATION						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	6.1 Identifying and Common Wireless Issues 6.2 Explain wireless Signal Strength and Quality 6.3 Explain interference Detection and Mitigation 6.4 Define Wireless Network Performance Optimization 6.5 Identify the Tools and Techniques for	Explain the common wireless issues Explain the process of wireless signal analysis Discuss the interference detection and mitigation Explain the wireless network performance optimization Outline tools and techniques for	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Diagnose common wireless issues Carry out analysis of wireless signal strength and quality Configure WLAN Carry out wireless Site Survey and Signal Analysis Secure WLAN Security Implementation and Testing Troubleshoot Wireless Network Design and Deploy a Secure Wireless	Guide the learner to diagnose common wireless issues guide the learners to carry out wireless signal strength and quality analysis Guide learners to carry out configuration of WLAN guide learners to carry out site survey and signal analysis Guide the learners to implement WLAN Security	Cisco Netacad.com Skill4all.com Internet Projector Laptop Packet Tracer Subnet Calculator Wireless router

	Wireless Network Monitoring	wireless network monitoring		Network	Guide learners to troubleshoot a wireless network Guide learners to design and deploy a secure wireless network (Capstone Project)	

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY</td></tr>
<tr><td colspan="2">MODULE: NETWORK SECURITY METHODOLOGIES</td><td>COURSE CODE: CNS 211</td><td>CONTACT HOURS: 20</td></tr>
<tr><td>YEAR: 2</td><td>TERM: 1</td><td>RE: REQUISTE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This module is designed to equip the trainee with the Understanding of security research and development methodologies</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1.0 Understand security research and development methodologies
2.0 Understand network security research and development projects
3.0 Understand network performance research</td></tr>
</table>

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: NETWORK SECURITY METHODOLOGIES				**COURSE CODE: C NS211**		**CONTACT HOURS: 60**
YEAR: 2	**TERM:** 1	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to introduce the trainee to the Understand network security research and development methodologies						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: UNDERSTAND SECURITY RESEARCH AND DEVELOPMENT METHODOLOGIES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain network security research 1.2 Explain development methodologies 1.3 Outline the goals of network security research 1.4 Explain research methodologies 1.5 List the types of research methodologies 1.6 Mention the benefits of network security research	Explain network security research Explain development methodologies Discuss the goals of network security research Identify the areas of network security research Explain research methodologies	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Conduct a threat model using threat modeler	Demonstrate and guide the learners to Conduct a threat model using threat modeler	Threat modeler Computer system, Whiteboard marker, Projector, Microsoft threat modelling tool

	1.7 List network security research and development tools and resources 1.8 List network security testing tools	Identify the types of research methodologies Discuss the benefits of network security research Identify network security research and development tools and resources Identify Network security testing tools				
GENERAL OBJECTIVE 2.0: UNDERSTAND NETWORK SECURITY RESEARCH AND DEVELOPMENT PROJECTS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-8	2.1 Explain areas of network security research i. Network architecture security ii. Network protocol security iii. Network traffic analysis iv. Intrusion detection and prevention v. Network security testing and evaluation	Discuss the areas of network security research	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Develop network security research projects Internet of things (IoT) Security	Guide the learners to develop network security research projects 1Internet of things (IoT) Security Testing Framework	NS-3, Nmap, Virtual box, Wireshark, Mandiant, Zap.

	2.2 Identify network security research projects i. Internet of things (IoT) Security Testing Framework ii. Network Security Awareness and Training program iii. Network Traffic Analysis for Anomaly Detection	Discuss network security research projects		Testing Framework 2.Network Security Awareness and Training program	2.Network Security Awareness and Training program 3.Network Traffic Analysis for Anomaly Detection	Nessus
GENERAL OBJECTIVE 3.0: UNDERSTAND NETWORK PERFORMANCE RESEARCH						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	3.1 Explain network performance research 3.2 Mention goals of network performance research 3.3 List areas of network performance research 3.4 Explain performance metrics 3.5 List types of performance metrics	**Explain** network performance Discuss goals of network performance research Identify and discuss areas of network performance research Explain performance metrics	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	**Discuss** the concept of network performance research	**Guide** learners to understand the concept of network performance research	**Wireshark**, Tcpdump, Netflow, SNMP, Network Simulators.

	3.6 List types of network performance tools	Identify types of performance metrics Identify types of network performance tools				

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY</td></tr>
<tr><td colspan="2">MODULE: NETWORK COMMUNICATION MODELS – OSI & TCP/IP</td><td>SUBJECT CODE: CNS 212</td><td>CONTACT HOURS: 60</td></tr>
<tr><td>YEAR: 1</td><td>TERM: 1</td><td>PRE: REQUISITE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This module is designed to enable, learners be able to understand, analyze, and apply the OSI and TCP/IP models to effectively map protocols, compare their structures, and troubleshoot network communication issues using a layered approach.</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1.0 Understanding the Network Communication Models

2.0 Understand the OSI Model

3.0 Know in-depth Analysis of OSI Layer
4.0 Understand TCP/IP Model

5.0 Comparing OSI vs. TCP/IP Models

6.0 Perform Network Troubleshooting Using the Layered Approach

7.0 Carry out Hands-on Labs and Practical Exercises

8.0 Perform Network Troubleshooting Using the Layered Approach</td></tr>
</table>

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: NETWORK COMMUNICATION MODELS – OSI & TCP/IP				**COURSE CODE: CNS 212**		**CONTACT HOURS: 60**
YEAR: 2	**TERM:** 1	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to enable, learners to be able to understand, analyze, and apply the OSI and TCP/IP models to effectively map protocols, compare their structures, and troubleshoot network communication issues using a layered approach.						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understanding the Network Communication Models						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1	1.1 Outline the importance of Network Models 1.2 Explain the OSI Model 1.3 Explain the TCP/IP model 1.4 Outline the History and Evolution of the Models 1.5 Explain the Importance of Layered Communication 1.6 list Benefits of Using the OSI and TCP/IP Models	Explain the purpose of Network models Explain the OSI Model structure and layers Explain the TCP/IP model Discuss the history and evolution of the models Outline the importance of the layered communication Outline the benefits of using OSI and TCP/IP models	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator			

GENERAL OBJECTIVE 2.0: Understand the OSI Model						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
2	2.1 Explain OSI Model Structure and Layers (7 Layers Overview) 2.2 Identify the Role of Each Layer in Network Communication 2.3 Explain layer-to-Layer Interaction and Data Encapsulation 2.4 Discuss Protocols Associated with Each OSI Layer 2.5 Explain OSI Model in Network Design 2.6 Troubleshoot OSI model network design	Discuss the OSI Model Structure and Layers (7 Layers Overview) Explain the Role of Each Layer in Network Communication Demonstrate layer-to-Layer Interaction and Data Encapsulation Discuss Protocols Associated with Each OSI Layer Demonstrate OSI Model in Network Design Demonstrate how to troubleshoot OSI model network design	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 3.0: Know In-depth Analysis of OSI Layers						

Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	3.1 Identify Network Access Layer: Data Link and Physical Components 3.2 Identify Internet Layer: IP, ICMP, and ARP Protocols 3.3 Identify Transport Layer: TCP vs. UDP and Their Applications 3.4 Identify Application Layer: HTTP, FTP, DNS, and Email Protocols	Explain Network Access Layer: Data Link and Physical Components Explain Internet Layer: IP, ICMP, and ARP Protocols Explain Transport Layer: TCP vs. UDP and Their Applications Explain Application Layer: HTTP, FTP, DNS, and Email Protocols	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 4.0: Understand TCP/IP Model						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-6	4.1 Explain TCP/IP Model Structure and Layers (4 Layers Overview) 4.2 Identify the importance of TCP/IP Model 4.3 Make a comparison between TCP/IP and OSI Models	Explain TCP/IP Model Structure and Layers (4 Layers Overview) Identify the importance of TCP/IP Model Give a comparison	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook			

	4.4 Explain Common Protocols in the TCP/IP Model 5.5 Explain the role of TCP/IP in the Modern Internet	between TCP/IP and OSI Models Explain Common Protocols in the TCP/IP Model Explain the role of TCP/IP in the Modern Internet	Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 5.0: Compare OSI vs. TCP/IP Models						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	5.1 Outline the Structural Differences Between OSI and TCP/IP 5.2 Explain Protocol Mapping Across the Two Models 5.3 Identify the advantages and Limitations of Each Model 5.4 Use Cases for OSI and TCP/IP	Discuss the Structural Differences Between OSI and TCP/IP Demonstrate the Protocol Mapping Across the Two Models Explain the advantages and Limitations of Each Model Demonstrate the use Cases for OSI and TCP/IP	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Troubleshoot Networks Using the two Models	Guide learners to troubleshoot Networks Using the two Models	

GENERAL OBJECTIVE 6.0: Perform Network Troubleshooting Using the Layered Approach						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-10	6.1 Define Layered Troubleshooting Methodology 6.2 Identifying Issues at Each Layer (Physical to Application) 6.3 Identify Common Network Errors and Their Causes 6.4 Identify Network Diagnostic Tools (Ping, Traceroute, Netstat, etc.)	Explain Layered Troubleshooting Methodology Discuss the issues at Each Layer (Physical to Application) Explain the Common Network Errors and Their Causes Outline Network Diagnostic Tools (Ping, Traceroute, Netstat, etc.)	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator	Resolve Real-world Network Issues	Guide the learners to resolve Real-world Network Issues	
GENERAL OBJECTIVE 7.0 Carry out Hands-on Labs and Practical Exercises						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12				Use Wireshark tool to analyse packet	Guide learners to use Wireshark tool	

				Simulate OSI and TCP/IP Communication in Network Simulators Configure Network Protocol Mapping Exercises Troubleshoot Layer-by-Layer Troubleshooting Scenarios Design and Troubleshoot a Network design using Both Models **(capstone project)**	to analyse packet Simulate OSI and TCP/IP Communication in Network Simulators Configure Network Protocol Mapping Exercises Troubleshoot Layer-by-Layer Troubleshooting Scenarios Design and Troubleshoot a Network design using Both Models	

PROGRAMME: NETWORKING AND SECURITY		
COURSE TITLE: **NETWORK SECURITY MANAGEMENT**	Course Code: CNS 221	Contact Hours: **60**
	Credit Unit:	**Theoretical: 24** Hours **Practical: 36** Hours
Year: 2 Term:2	Pre-requisite:	
GOAL: This course is designed to provide the trainee with the basic knowledge in network		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand Network identity management 2.0 Understand Network access management 3.0 Understand components of IAM systems		

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: NETWORK SECURITY MANAGEMENT				**COURSE CODE: CNS 221**		**CONTACT HOURS: 60**
YEAR: 2	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to equip the trainee with the knowledge of network identity and access management						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understand Network identity management						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-4	1.8 Explain network identity management 1.9 List types of network identity management	State the need for network devices to have unique identity	Whiteboard, marker, projector,	Identify the IP address of devices on a network.	Set up a simple network with at-least 2 PC, 1	Computer with Packet tracer simulation

	1.10 Explain the format of IP address and MAC address 1.11 Explain the different layers IP and MAC address are used 1.12 List the benefits of network identity management	Guide the learners to understand that network devices are identify using network addresses Introduce the IP address and MAC address as the network address to uniquely identify a device on a network Guide the learners to understand the format of IP and MAC address Explain that MAC address is found on the NIC of a computer learners used on a network	Computer system.	Assign IP address to network devices. Identify the MAC address of computers on a network. Name the different devices on a network. Assign an IP address to a network device. Locate and visualize the MAC address of a computer on a network.	switch and 1 printer.	software installed.
GENERAL OBJECTIVE 2.0: Understanding Network access management						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-8	2.1 Explain network access management	Define the network access management	Printed Charts, Projector, Whiteboard, Computer,	Authenticate users on a network	Demonstrate how to set up access rights to devices	Computers with packet tracer simulator

	2.2 List and explain the types of network access 2.3 State the importance of network access management	Explain the types of access in a network (local access, remote access, public access, etc) Introduce the network access control management policies (Authentication, Authorization etc.)	YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer .	Set access rights to users on a network		installed
GENERAL OBJECTIVE 3.0: Understanding components of IAM systems						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	3.1 List basic components of IAM systems 3.2 List and explain the different user roles in a network 3.3 Explain some to the benefits of IAM systems 3.4 Explain the best practices to implement IAM policies	Introduce the basic components of IAM system Explain the benefits of access management systems Explain the	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Create user accounts Assigned user permissions/roles	Demonstrate how create users account and assign permissions/ roles Demonstrate how to segment a	Computers on a network,

		various access roles in a network	Cisco Netacad.com Skill4all.com Packet Tracer		large network into smaller networks and assign access roles	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY			
MODULE Network optimization:		**COURSE CODE: CNS 222**	**CONTACT HOURS: 60**
YEAR:2	**TERM:2**	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours
GOAL: This course is designed to provide the trainee with the basic knowledge in network cabling and optimization			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1. Understand the concepts Network optimization 2. Learn how to model and optimize network performance 3. Understand network efficiency using optimization techniques 4. Know how to optimize network performance 5. Understand Network Cabling and Infrastructure			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: Network Optimization				**COURSE CODE:**		**CONTACT HOURS: 60**
YEAR: 2	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to introduce the trainee to the concepts Network optimization						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understand the concept of Network optimization						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Explain the term network optimization	Explain the term network optimization	Printed Charts, Projector, Whiteboard, Computer,	Demonstrate how to use network optimization	Guide the learners to demonstrate how to use	Packet tracer simulation software

	1.2 Explain reasons to optimize a network 1.3 List the benefits of network optimization 1.4 Identify the network optimization tool 1.5 List the goals of network optimization	Explain reasons to optimize a network Highlight the benefits (reduce cost, resource allocation) of network optimization Introduce the tools for network optimization Discuss network optimization goals Discuss network optimization technique Discuss the challenges faced in	YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	tools to optimize a network	network optimization tools to to optimize a network	

	1.6 List network optimization techniques 1.7 Mention the challenges of network optimization	network optimization				

GENERAL OBJECTIVE 2.0: Learn how to model and optimize network performance						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	2.1 Explain network modelling 2.2 List the types of network modelling 2.3 Outline network modelling techniques 2.4 List network modelling tools	Explain network modelling State the different types of network modelling Discuss network modelling techniques Describe network modelling tools	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Model a computer network and analyze its properties	Guide students to model a computer network and analyze its properties	Python 3.x, network library, matplotlib library, Gephi.

	2.5 List the uses of network modelling 2.6 Discuss the benefits of network modelling 2.7 Explain the challenges of network modelling	Discuss the use of network modelling Discuss the benefits of network modelling Discuss the challenges faced in network modelling				
GENERAL OBJECTIVE 3.0: Understand network efficiency using optimization techniques						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-7	3.1 Explain network optimization algorithms 3.2 Explain Dijkstra's Algorithm and its implementation in network optimization	Explain network optimization. Explain the different types of network optimization algorithms Discuss the techniques of network optimization	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Carryout implementing Dijkstra's Algorithm for network optimization	Demonstrate implementing Dijkstra's Algorithm for network optimization	Python 3.x, network library , matplotlib library.

	3.3 List the types of network optimization algorithms 3.4 List the techniques of network optimization algorithm 3.5 Mention uses of network optimization algorithms 3.6 Outline the benefits of network optimization algorithms 3.7 Outline the challenges of network optimization algorithms	Explain the uses of network optimization algorithms Discuss the benefits of network optimization algorithms Discuss the challenges of network optimization algorithms				

GENERAL OBJECTIVE 4.0 Know how to optimize network performance						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
8-10	4.1 Explain network performance Analysis 4.2 List the goals of network performance Analysis 4.3 Explain network performance metrics 4.4 Mention network performance metrics 4.5 Mention network performance analysis techniques	Explain network performance analysis Identify the goals of network performance analysis Explain network performance metrics Discuss network performance metrics Explain network performance analysis techniques Identify network performance analysis	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Perform analyzing a network traffic with Wireshark	Guide the leaners to perform network analysis with Wireshark	Computer system or laptop Internet connection, Wireshark application,ethernet or Wi-Fi

	4.6 List network performance analysis 4.7 Mention the benefits of network performance analysis 4.8 Outline the challenges of network performance analysis	Discuss the benefits of network performance analysis Discuss the challenges of network performance analysis				
GENERAL OBJECTIVE 5.0: Understand Network Cabling and Infrastructure						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	5.1 Explain network cabling and infrastructure	Explain network cabling and infrastructure	Printed Charts, Projector, Whiteboard, Computer, YouTube	Install a network cabling system	Demonstrate and guide learners to install a network	Cable tester, cable stripper, cable cutter, punch-down tool, patch cables,

	5.2 List and explain the types of network cabling 5.3 Identify the uses of network cables by type 5.4 Explain network infrastructure components 5.5 List types of network infrastructure components 5.6 Benefits of proper cabling	Discuss the types of network cabling Explain the uses of network cables by types Explain network infrastructure Explain the types of network infrastructure Discuss the benefits of proper cabling	Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator		cabling system for a small office	RJ-45 connectors, cat5e or Cat6 cables

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY			
MODULE: Cloud and IoT security		**COURSE CODE: CNS 231**	**CONTACT HOURS: 60**
YEAR: 2	**TERM:** 3	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours
GOAL: This module is designed to introduce the trainee to the basic knowledge of cloud and IoT security			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Know cloud security 2.0 Know IoT Security 3.0 Understand the relationship between cloud and IoT security			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: CLOUD AND IOT SECURITY				**COURSE CODE: CNS231**		**CONTACT HOURS: 60**
YEAR: 2	**TERM:** 3	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to quip the trainee with the Knowledge of cloud security						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Know cloud security						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain is cloud security 1.2 Mention the benefits of cloud security	Explain cloud security	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Conduct network assessment Conduct and	Guide students to conduct network assessment	AWS firewall, AWS IAM, AWS CloudWatch, AWS CloudTrail, AWS VPC flow logs.

	1.3 Outline cloud security challenges 1.4 List uses of cloud security 1.5 Identify cloud security frameworks 1.6 Explain cloud security tools and technologies 1.7 Explain Cloud security Measures	Discuss the benefits of cloud security Discuss the challenges of cloud security Identify uses of cloud security and discuss Identify cloud security frameworks and discuss Discuss cloud security tools and technologies usage Explain cloud security measures	Cisco Netacad.com Skill4all.com Packet Tracer	Implement network segmentation	Guide students to conduct and implement network segmentation	

GENERAL OBJECTIVE 2.0: know IoT Security						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-8	2.1 Explain IoT Security 2.2 Mention the benefits of IoT security 2.3 Outline IoT security challenges 2.4 Outline the uses of IoT security 2.5 State IoT security frameworks 2.6 List IoT security tools and technologies 2.8 List IoT security measures	Explain IoT security Discuss the benefits of IoT security Discuss the challenges of IoT security Identify uses of IoT security and discuss Discuss IoT security frameworks Discuss IoT security tools and technologies usage Explain IoT security	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator	Conduct an IoT device assessment Conduct and implement device authentication	Guide the learners to Conduct an IoT device assessment Guide learners to Conduct and implement device authentication	AWS IoT core, AWS lambda

		measures				
GENERAL OBJECTIVE 3.0: Understand the relationship between cloud and IoT security						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	3.1 Explain IoT 3.2 Explain Cloud Security 3.3 Mention the relationship between IoT and Cloud security 3.4 Discuss IoT and Cloud Security threats 3.5 Mention the benefits of cloud based IoT 3.6 State the different types of	Explain IoT Explain Cloud Security Discuss the relationship between IoT and Cloud security Explain IoT and Cloud Security threats Discuss the benefits of cloud based IoT Explain different types of cloud-based Applications	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

	cloud-based Applications 3.7 Discuss the challenges of cloud based IoT	Discuss the challenges of cloud based IoT				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY			
MODULE: CLOUD NETWORKING		**Subject CODE: CNS311**	**CONTACT HOURS: 60**
YEAR: 3	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours
GOAL: This course is designed to equip the learners with knowledge of cloud networking and migration			
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Understand cloud networking 2.0 Understand the characteristics of cloud network Management 3.0 Understand cloud networking Architecture 4.0 Understand cloud networking security 5.0 Know Challenges of cloud networking and its limitations 6.0 Understand Cloud Network Services			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: Cloud Networking				**COURSE CODE: CNS311**		**CONTACT HOURS: 60**
YEAR: 111	**TERM:** 1	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to equip the trainee with the knowledge of cloud networking						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understand cloud networking						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Explain Cloud networking 1.2 Explain the characteristics of cloud network	Introduce the concept of cloud networking and its relevance in today's digital landscape	Printed Charts, Projector, Whiteboard, Computer, YouTube			

	1.3 Explain some of the benefits of cloud networking 1.4 Draw Cloud Networking Models 1.5 Define Cloud Networking Technologies 1.6 Outline Cloud Networking Challenges 1.7 Use case studies or examples to illustrate the applications of cloud networking in real-world scenarios	Use diagrams and illustrations to explain the key characteristics of cloud networking, such as scalability, on-demand self-service, and resource pooling Discuss the benefits of cloud networking, including reduced costs, increased agility, and improved reliability Sketch and label Cloud Networking Models Explain Cloud Networking Technologies Discuss Cloud Networking Challenges	Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 2.0: Understand the characteristics of cloud network management						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	2.1 Describe the key considerations for managing cloud	Discuss the key considerations for managing cloud	Printed Charts, Projector, Whiteboard,	Design and present cloud network management plan	Have students design and present	

	networks, including scalability, performance, and security 2.2 Identify the tools for troubleshooting cloud network 2.3 Describe the techniques for monitoring cloud networks 2.4. Identify the importance of automation and orchestration in cloud network management	networks, using real-world examples to illustrate key concepts Explain the tools for troubleshooting Explain the techniques for monitoring cloud networks, including cloud-based monitoring tools and network analytics Use case studies or examples to illustrate the importance of automation and orchestration in cloud network management	Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer		their own cloud network management plan	
GENERAL OBJECTIVE 3.0: Understand cloud networking Architecture						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-6	3.1 Define Cloud networking Architecture 3.2 Describe the different types of cloud network architectures, including public, private, and hybrid clouds	Explain Cloud networking Architecture Use diagrams and illustrations to explain the different types of	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos,	Design and present cloud network architecture	Have the learners design and present their own cloud network	White board maker Internet, computer systems and projector

	3.3. Explain the components of a cloud network architecture, including servers, storage, and networking equipment 3.4. Identify the key considerations for designing a cloud network architecture	cloud network architectures Discuss the components of a cloud network architecture and their roles in delivering cloud services Use case studies or examples to illustrate the design considerations for cloud network architectures	Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer		architectur e	
GENERAL OBJECTIVE 4.0: Understand cloud networking security						
Wee k	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	4.1 Explain cloud networking security 4.2 Identify the key security threats to cloud networks, including data breaches, unauthorized access, and denial-of-service (DoS) attacks 4.3 Explain the security measures for protecting cloud networks, including firewalls, intrusion detection systems, and encryption	Explain cloud networking security Discuss the key security threats to cloud networks and their potential impact on organizations Explain the security measures for	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Design and present their own cloud network security plan	Have students design and present their own cloud network security plan	White board maker Internet, computer systems and projector

	4.4 Describe the importance of compliance and regulatory requirements for cloud network security	protecting cloud networks, using diagrams and illustrations to illustrate key concepts Use case studies or examples to illustrate the importance of compliance and regulatory requirements for cloud network security	Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 5.0: Identify Challenges of cloud networking and its limitations						
9-10	5.1 Explain Challenges of cloud networking 5.2 Explain cloud networking Limitations 5.3 Explain cloud networking Technical Limitations	Discuss Challenges of cloud networking Discuss cloud networking limitations Discuss cloud networking Technical Limitations	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

GENERAL OBJECTIVE 6.0: 0 Understand Cloud Network Services						
11-12	6.1 Describe the different types of cloud network services, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) 6.2. Explain the benefits and challenges of each cloud network service model 6.3. Identify the key considerations for selecting a cloud network service provider	Discuss the different types of cloud network services, using diagrams and illustrations to explain key concepts Explain the benefits and challenges of each cloud network service model, using real-world examples to illustrate key concepts Use case studies or examples to illustrate the key considerations for selecting a cloud network service provider	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN			
MODULE: NETWORK SECURITY AND THREAT INTELLIGENCE		**COURSE CODE: CNS312**	**CONTACT HOURS: 60**
YEAR: 3	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours
GOAL: This course is designed to equip the learners with basic knowledge of network security and threat Intelligence			

GENERAL OBJECTIVES:

On completion of this module, the trainee should be able to:

1.0 Understand network security and threat intelligence

2.0 Understand Network Vulnerability Management and incident response

3.0 Understand network security monitoring

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: NETWORK SECURITY AND THREAT INTELLIGENCE				**COURSE CODE: CNS312**	**CONTACT HOURS: 60**	
YEAR: 111	**TERM:** 1	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GENERAL OBJECTIVE 1.0: Understand network security and threat intelligence						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: Understand network security and threat intelligence						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Define network security and its importance 1.2. Identify the key components of network security	Introduce the concept of network security and its relevance in today's	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook			

	1.3. Explain the different types of network threats 1.4 Define threat intelligence and its importance in network security 1.5. Identify the different types of threat intelligence, including strategic, tactical, and operational intelligence 1.6. Explain the benefits of using threat intelligence in network security	digital landscape Use diagrams and illustrations to explain the key components of network security, such as firewalls, intrusion detection systems, and encryption Discuss the different types of network threats, including malware, phishing, and denial-of-service (DoS) attacks.	Cisco Netacad.com Skill4all.com Packet Tracer			

		Introduce the concept of threat intelligence and its relevance in network security Use real-world examples to illustrate the different types of threat intelligence Discuss the benefits of using threat intelligence in network security, including improved incident response and reduced risk				

GENERAL OBJECTIVE 2.0: Understand Network Vulnerability Management and incident response						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-8	2.1. Define vulnerability management 2.2 Identify the importance of vulnerability management in network security 2.3. Identify the different types of network vulnerabilities, including software vulnerabilities and configuration vulnerabilities 2.4. Explain the process of vulnerability management, including identification, classification, and remediation. 2.5. Define incident response 2.6. Identify the importance of incident response in network security	Introduce the concept of vulnerability management and its relevance in network security Use real-world examples to illustrate the different types of network vulnerabilities Discuss the process of vulnerability management, using diagrams and illustrations to explain key concepts Introduce the concept of incident response and its relevance in network security Use real-world examples to illustrate	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Create a vulnerability management plan for a fictional organization Create an incident response plan for a fictional organization	Have students create a vulnerability management plan for a fictional organization Have students create an incident response plan for a fictional organization	Desktop/laptop computers, internet access

	2.7. Identify the different types of network incidents, including malware outbreaks and denial-of-service (DoS) attacks 2.8. Explain the process of incident response, including detection, containment, and eradication	the different types of network incidents Discuss the process of incident response, using diagrams and illustrations to explain key concepts				
GENERAL OBJECTIVE 3.0: Understand network security monitoring						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-12	3.1. Define network security monitoring 3.2 Identify the importance of security monitoring in network security 3.3. Identify the different types of network security monitoring, including intrusion detection systems and security information and event management (SIEM) systems	Introduce the concept of network security monitoring and its relevance in network security Use real-world examples to illustrate the different types of network security monitoring	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	create a network security monitoring plan for a fictional organization	Have students create a network security monitoring plan for a fictional organization	

	3.4. Explain the benefits of using network security monitoring in network security	Discuss the benefits of using network security monitoring in network security, including improved incident response and reduced risk				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE				
MODULE: Network security governance and compliance			**COURSE CODE: CNS 321**	**CONTACT HOURS: 60**
YEAR: 3	**TERM 2**	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours	
GOAL: This course is designed to equip the learners with basic knowledge of cloud networking and migration				
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand Network security governance 2.0 Understand Network Security Compliance 3.0 Understand Network Security Auditing and Compliance 4.0 Understand Network security and compliance principles				

PROGRAMME NATIONAL TECHNICAL CERTIFICATE IN NETWORKING AND SYSTEM SECURITY						
MODULE: Network security governance and compliance				**COURSE CODE: CNS321**		**CONTACT HOURS: 60**
YEAR: 3	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to equip the trainee with the understanding of network security governance and compliance						
Theoretical Content				**Practical Content**		
1.0 **GENERAL OBJECTIVE 1.0:** UNDERSTAND NETWORK SECURITY GOVERNANCE						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-3	1.1. Define network security governance 2.2 identify the importance of network security governance 2.3. Identify the key components of network	Introduce the concept of network security governance and its relevance in today's digital	Printed Charts, Projector, Whiteboard, Computer, YouTube			

	security governance, including policies, procedures, and standards 2.4. Explain the role of governance in ensuring network security	landscape Use diagrams and illustrations to explain the key components of network security governance Discuss the role of governance in ensuring network security, including the importance of policies, procedures, and standards	Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

Theoretical Content				**Practical Content**		
2.0 **GENERAL OBJECTIVE 2.0:** Understand Network Security Compliance						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4-6	2.1. Define network security compliance 2.2 State the importance of network security compliance 2.3. Identify the key regulatory requirements for network security, including HIPAA, PCI-DSS, and GDPR	Introduce the concept of network security compliance and its relevance in today's digital landscape Use real-world examples to illustrate the key	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet,			

	2.4. Explain the process of ensuring network security compliance, including risk assessments and audits	regulatory requirements for network security Discuss the process of ensuring network security compliance, including risk assessments and audits	Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

Theoretical Content				**Practical Content**		
3.0 **GENERAL OBJECTIVE 3.0:** Understand Network Security Auditing and Compliance						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-9	3.1 Define network security auditing and compliance and its importance 3.2 Identify the key steps in the network security auditing and compliance process, including audit planning, audit execution, and audit reporting 3.3 Explain the role of network security auditing and compliance in ensuring network security	Introduce the concept of network security auditing and compliance and its relevance in today's digital landscape Use diagrams and illustrations to explain the key steps in the network security auditing and compliance process Discuss the role of network security	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

		auditing and compliance in ensuring network security, including the importance of audit planning, audit execution, and audit reporting				

Theoretical Content				**Practical Content**		
4.0 **GENERAL OBJECTIVE 5.0:** Understand Network security and compliance principles						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10-12	1.1 Define Network security and compliance principles 1.2 Explain Key Principles of Network Security and Compliance 1.3 Explain Benefits of Network Security and Compliance Principles	Explain Network security and compliance principles Discuss Key Principles of Network Security and Compliance Discuss Benefits of Network Security and Compliance Principles	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN			
MODULE: NETWORK SECURITY RISK MANAGEMENT AND INCIDENT RESPONSE		**COURSE CODE: CNS322**	**CONTACT HOURS: 60**
YEAR: 3	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours
GOAL: This course is designed to equip the learners with advanced knowledge of network security and risk management			
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand Network Security Risk Management Fundamentals 2.0 Understand Network Security Risk Assessment and mitigation 3.0 Understand Network Security Incident Response, team (IRT) and communication 4.0 Identify incident response Tools			

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE						
MODULE: NETWORK SECURITY RISK MANAGEMENT AND INCIDENT RESPONSE			**COURSE CODE: CNS322**		**CONTACT HOURS: 60**	
YEAR: 3	**TERM:** 2	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to equip the trainee with the knowledge of network security, risk management and incident response						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0 Understand Network Security Risk Management Fundamentals						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-3	1.1 Define network security risk management and its importance 1.2 Identify the key components of network security risk management	Introduce the concept of network security risk management Use diagrams to illustrate the key	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos,	Conduct a risk assessment for a fictional organization Develop a risk management	Guide learners to Conduct a risk assessment for a fictional organization Guide learners	Internet Computer system projector

	1.3 Explain the risk management process	components of network security risk management Discuss the risk management process, including risk assessment, risk mitigation, and risk monitoring	Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	plan for a fictional organization	Develop a risk management plan for a fictional organization	
5.0 **GENERAL OBJECTIVE 2.0:** Understand Network Security Risk Assessment and Mitigation						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
4-6	2.1. Define network security risk assessment and its importance 2.2. Identify the key steps in the network security risk assessment process 2.3. Explain the different types of risk assessments 2.4 Identify Network Security Risk Management Tools 2.5 Define network security risk mitigation and its importance	Introduce the concept of network security risk assessment Use diagrams to illustrate the key steps in the network security risk assessment process Discuss the different types of risk assessments, including qualitative and quantitative risk assessments	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Guide learners to Identify Network Security Risk Management Tools	Guide learners to identify Network Security Risk Management Tools	

	2.6. Identify the key steps in the network security risk mitigation process 2.7. Explain the different types of risk mitigation strategies	Explain Network Security Risk Management Tools introduce the concept of network security risk mitigation Use diagrams to illustrate the key steps in the network security risk mitigation process Discuss the different types of risk mitigation strategies, including risk avoidance, risk transfer, and risk acceptance				
6.0 **GENERAL OBJECTIVE 3.0:** UNDERSTAND NETWORK SECURITY INCIDENT RESPONSE, TEAM AND COMMUNICATION						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-9	3.1 Define network security incident response and its importance 3.2. Identify the key steps in the network security incident response process 3.3. Explain the different types of incident response strategies	Introduce the concept of network security incident response Use diagrams to illustrate the key steps in the network security incident	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook	Develop an incident response plan for a fictional organization Conduct a tabletop exercise to simulate an incident response scenario	Guide learners to Develop an incident response plan for a fictional organization Guide learners	Internet Computer system Projector

	3.4 Define the role of a CSIRT and its importance 3.5 Identify the key components of a CSIRT 3.6 Explain the different types of CSIRT structures 3.7 Define the importance of communication in incident response 3.8 Identify the key components of an incident response communication plan 3.9 Explain the different types of communication strategies	response process Discuss the different types of incident response strategies, including containment, eradication, and recovery Introduce the concept of a CSIRT Use diagrams to illustrate the key components of a CSIRT Discuss the different types of CSIRT structures, including centralized and decentralized models Introduce the concept of incident response communication Use diagrams to illustrate the key components of an	Cisco Netacad.com Skill4all.com Packet Tracer	Develop a CSIRT plan for a fictional organization Conduct a tabletop exercise to simulate a CSIRT scenario Develop an incident response communication plan for a fictional organization Conduct a tabletop exercise to simulate an incident response communication scenario	to Conduct a tabletop exercise to simulate an incident response scenario Guide learners to Develop a CSIRT plan for a fictional organization Guide learners to Conduct a tabletop exercise to simulate a CSIRT scenario Guide learners to Develop an incident response communication plan for a fictional organization Guide learners to Conduct a tabletop	

		incident response communication plan Discuss the different types of communication strategies, including internal and external communication			exercise to simulate an incident response communication scenario	
GENERAL OBJECTIVE 4.0: IDENTIFY INCIDENT RESPONSE TOOLS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
10-12	4.1 Define incident response Tools 4.2 Explain Incident Response Tools by Category 4.3 Explain Incident Response Tools by Vendor	Explain common incident response Tools Discuss Incident Response Tools by Category Discuss Incident Response Tools by Vendor	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Identify common incident response Tools Identify Incident Response Tools by Category Identify Incident Response Tools by Vendor	Guide learners to identify common incident response Tools Guide learners to understand Incident Response Tools by Category Guide learners to Incident Response Tools by Vendor	Laptop Chart Yt videos

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN</td></tr>
<tr><td colspan="2">MODULE: FIREWALL TECHNOLOGIES</td><td>COURSE CODE: CNS 331</td><td>CONTACT HOURS: 60</td></tr>
<tr><td>YEAR: 3</td><td>TERM 3</td><td>PRE: REQUISITE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This module is designed to enable learners to configure, deploy, and manage firewall technologies to secure networks, enforce security policies, and prevent unauthorized access.</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES: On completion of this course, the students should be able to:
1.0 Understand the Firewalls
2.0 Understand Types of Firewalls
3.0 Deploy Firewall Architectures
4.0 Configure Firewall Rule and Policy Management
5.0 Understand Firewall Features and Technologies
6.0 Secure Using Firewall Security Best Practices</td></tr>
</table>

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE						
MODULE: FIREWALL TECHNOLOGIES				**COURSE CODE: CNS331**		**CONTACT HOURS: 60**
YEAR: 3	**TERM: 3**	**PRE: REQUISITE:**		**Theoretical: 24** Hours **Practical: 36** Hours		
GOAL: This module is designed to enable learners to configure, deploy, and manage firewall technologies to secure networks, enforce security policies, and prevent unauthorized access.						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0 : UNDERSTAND THE FIREWALLS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Define firewalls 1.2 State the Purpose of Firewalls 1.3 Outline the evolution of Firewall Technologies 1.4 Explain Role of Firewalls in Network Security 1.5 Distinguish between Firewall and Other Security Mechanisms 1.6 List common Threats Mitigated by Firewalls	Explain firewalls Explain the Purpose of Firewalls Discuss the evolution of Firewall Technologies Outline the Role of Firewalls in Network Security Differentiate between Firewall and Other Security Mechanisms Outline the common Threats Mitigated by Firewalls	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

GENERAL OBJECTIVE 2.0: UNDERSTAND TYPES OF FIREWALLS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	2.1 Define Packet Filtering Firewalls 2.2 Define Stateful Inspection Firewalls 2.3 Define Proxy Firewalls 2.4 List Next-Generation Firewalls (NGFW) 2.5 Define Cloud-based Firewalls and Firewall-as-a-Service (FWaaS) 2.6 List Comparison of Firewall Types and Use Cases	Discuss Packet Filtering Firewalls Explain Stateful Inspection Firewalls Explain Proxy Firewalls Explain Next-Generation Firewalls (NGFW) Discuss Cloud-based Firewalls and Firewall-as-a-Service (FWaaS) Outline Comparison of Firewall Types and Use Cases	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 3.0: Deploy Firewall Architectures						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-6	3.1 Differentiate between On-Premises and Cloud-Based Firewalls	Distinguish between On-Premises and Cloud-Based Firewalls Distinguish between Perimeter vs. Internal Firewalls	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com			

	3.2 Distinguish between Perimeter vs. Internal Firewalls 3.3 Compare the Single-Layer vs. Multi-Layer Firewall Architectures 3.4 Define DMZ (Demilitarized Zone) and Firewall Placement 3.5 Explain the Firewall Redundancy and High Availability	Compare the Single-Layer vs. Multi-Layer Firewall Architectures Explain DMZ (Demilitarized Zone) and Firewall Placement Explain the Firewall Redundancy and High Availability	Packet Tracer			
GENERAL OBJECTIVE 4.0: Configure Firewall Rule and Policy Management						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	4.1 Identify Firewall Rules and ACLs 4.2 Explain Network Address Translation (NAT) 4.3 Explain Port Forwarding	Explain Firewall Rules and ACLs Discuss Explain Network Address Translation (NAT) Explain Port Forwarding	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

GENERAL OBJECTIVE 5.0: Understand Firewall Features and Technologies						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-10	5.1 Define Deep Packet Inspection (DPI) 5.2 Define Intrusion Detection and Prevention Systems (IDPS) 5.3 Define VPN 5.4 Explain IPSec/SSL 5.5 Explain Integrate with Firewalls (IPSec, SSL VPN) 5.6 Explain the Application Layer Filtering 5.7 Explain web Filtering	Explain Deep Packet Inspection (DPI) Explain Intrusion Detection and Prevention Systems (IDPS) Explain VPN Explain IPSec/SSL Explain the Integration with Firewalls (IPSec, SSL VPN) Explain the Application Layer Filtering Explain web Filtering	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			
GENERAL OBJECTIVE 6.0: Secure Using Firewall Security Best Practices						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12	6.1 Explain the Principle of Least Privilege in Firewall Policies	Discuss the Principle of Least Privilege in Firewall Policies	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com			

	6.2 Explain the Regular Firewall Audits and Policy Reviews 6.3 Outline the Firewall Hardening Techniques 6.4 Explain the Automating Firewall Policy Management	Explain the Regular Firewall Audits and Policy Reviews Explain list the Firewall Hardening Techniques Discuss the Automating Firewall Policy Management	Skill4all.com Packet Tracer			

<table>
<tr><td colspan="4">PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE</td></tr>
<tr><td colspan="2">MODULE: Network Design and Media: Infrastructure, Planning, and Implementation</td><td>COURSE CODE: CNS 332</td><td>CONTACT HOURS: 60</td></tr>
<tr><td>YEAR: 3</td><td>TERM 3</td><td>PRE: REQUISITE:</td><td>Theoretical: 24 Hours
Practical: 36 Hours</td></tr>
<tr><td colspan="4">GOAL: This course is designed to enable the trainee to be able to design, implement, and optimize network infrastructures by selecting appropriate networking media, topologies, and technologies for efficient and secure data transmission.</td></tr>
<tr><td colspan="4">GENERAL OBJECTIVES: On completion of this course, the students should be able to:
1.0 Understand Network Design
2.0 Know network Topologies and Their Applications
3.0 Understand Structured Cabling Systems and Standards
4.0 Design Wired and Wireless Networks
5.0 Understand IP Addressing and Network Planning
6.0 Hands-on Labs and Practical Exercises</td></tr>
</table>

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ENGINEERING CRAFT PRACTICE						
MODULE: Network Design and Media: Infrastructure, Planning, and Implementation				**COURSE CODE: CNS332**		**CONTACT HOURS: 60**
YEAR: 3	**TERM: 3**	**PRE: REQUISITE:**	**Theoretical: 24** Hours **Practical: 36** Hours			
GOAL: This module is designed to enable the trainee to be able to design, implement, and optimize network infrastructures by selecting appropriate networking media, topologies, and technologies for efficient and secure data transmission.						
Theoretical Content				**Practical Content**		
GENERAL OBJECTIVE 1.0: UNDERSTAND NETWORK DESIGN						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Explain of Network Design and Its Importance 1.2 Identify Key Components of Network Architecture 1.3 Outline Network Design Considerations (Scalability, Security, Redundancy)	Discuss of Network Design and Its Importance Explain Key Components of Network Architecture Explain Network Design Considerations (Scalability, Security, Redundancy)	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer Subnet Calculator			

	1.4 Explain Network Models (Hierarchical, Flat, and Hybrid) 1.5 Identify Common Design Challenges and Solutions	Explain Network Models (Hierarchical, Flat, and Hybrid) Explain Common Design Challenges and Solutions				
GENERAL OBJECTIVE 2.0: KNOW NETWORK TOPOLOGIES AND THEIR APPLICATIONS						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
3-4	2.1 Describe Star, Bus, Ring, and Mesh Topologies 2.2 Differentiate between Hybrid and Hierarchical Network Topologies 2.3 Choose the Right Topology for Different Scenarios	Explain Star, Bus, Ring, and Mesh Topologies Explain Hybrid and Hierarchical Network Topologies Outline the consideration to choose the Right Topology for Different Scenarios 1.4 Explain the Impact of Topology on Performance and Fault Tolerance	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer			

	2.4 Identify the Impact of Topology on Performance and Fault Tolerance					
GENERAL OBJECTIVE 3.0: Understand Structured Cabling Systems and Standards						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
5-6	3.1 Identify the Components of a Structured Cabling System 3.2 Explain the ANSI/TIA-568 and ISO/IEC 11801 Standards 3.3 Identify the Cable Categories and Their Performance Ratings	Explain the Components of a Structured Cabling System Explain the ANSI/TIA-568 and ISO/IEC 11801 Standards Explain the Cable Categories and Their Performance Ratings	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Carry out cable installation and management	Guide the learners to carry out installation and management of cable	

GENERAL OBJECTIVE 4.0: Design Wired and Wireless Networks						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
7-8	4.1 Explain the concept of LAN, MAN, and WAN Design Principles 4.2 Select the Right Networking Equipment (Switches, Routers, Firewalls) 4.3 Identify the Wireless Network Design Considerations (Wi-Fi Standards, Coverage, Interference) 4.4 Explain the Planning and Deploying of Network Infrastructure in Different Environments	Explain the concept of LAN, MAN, and WAN Design Principles Explain the consideration to select the Right Networking Equipment (Switches, Routers, Firewalls) Explain the Wireless Network Design Considerations (Wi-Fi Standards, Coverage, Interference) Explain the Planning and Deploying of Network Infrastructure in Different Environments	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Integrate Wired and Wireless Networks for Optimal Performance	Guide learners to integrate wireless networks for optimal performance	

GENERAL OBJECTIVE 5.0: UNDERSTAND IP ADDRESSING AND NETWORK PLANNING						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
9-10	5.1 Explain IP Addressing and Sub-netting in Network Design 5.2 Identify IPv4 vs. IPv6 Considerations in Modern Networks 5.3 Explain VLAN and Network Segmentation Strategies	Discuss IP Addressing and Sub-netting in Network Design Explain IPv4 vs. IPv6 Considerations in Modern Networks Explain VLAN and Network Segmentation Strategies	Printed Charts, Projector, Whiteboard, Computer, YouTube Videos, Internet, Notes, Textbook Cisco Netacad.com Skill4all.com Packet Tracer	Implement Redundancy and Load Balancing	Guide the learners to implement redundancy and load balancing	

GENERAL OBJECTIVE 6.0: HANDS-ON LABS AND PRACTICAL EXERCISES						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Learning Resources**
11-12				6.1 Design network Using Simulation Tools (Packet Tracer, GNS3)	Guide learners to design network Using Simulation Tools (Packet Tracer, GNS3)	**Cisco Packet Tracer,** **GNS3**

				6.2 Configure and Test Structured Cabling Systems 1.3 Carry out site survey for Wireless Network and Optimization 1.4 Troubleshoot Media-Related Network Issues	Guide learners to configure and Test Structured Cabling Systems Guide learners to carry out site survey for Wireless Network and Optimization Guide learners to troubleshoot Media-Related Network Issues	**Crimper** **Cable tester**

LIST OF EQUIPMENT, SOFTWARE AND TOOLS IMPORTANT FOR NETWORK AND SECURITY COURSE

Network Cabling Equipment and tools;

S/N	EQUIPMENT	QUANTITY	RATIO
1.	Computer System	40	1:40
2.	3M Hard Hat	40	1:40
3.	DeWalt Safety Glasses	40	1:40
4.	First Aid Kit	1	40:40
5	Fiber Optic OTDR	10	1:4:40
6	Cable Fault Locator	10	1:4:40
7	Network Protocol Analyzer	10	1:4:40
8	Brother Label Maker	5	1:8:40
9	Cable Tester Software	10	1:4:40
10	Network Cable Scanner	5	1:8:40
11	Greenlee Cable Fish Tape	10	1:4:40
12	Klein Tools Cable Pulling Tools	10	1:4:40
13	Cablofil Cable Ladder Rack	2	2:40
14	Fiber Optic Cleaver	10	1:4:10
15	Panduit RJ-45 Crimp Tool	10	1:4:40
16	Cable Clips	80	10:10:40
17	Fiber Optic Connector Crimp Tool	10	1:4:40
18	3M Cable Tie Gun	200	20:4:200
19	Fiber Optic Cable Stripper	10	1:4:40
20	Greenlee Cable Cutters	10	1:4:40
21	RJ 45 Clips	Assorted	
	NETWORK EQUIPMENT		
22	Routers: Cisco ISR, Cisco ASR, Juniper SRX	10	1:4:40
23	Switches: Cisco Catalyst, Cisco Nexus, Juniper EX	10	1:4:40
24	Firewalls: Cisco ASA, Juniper SRX, Check Point	1 Each	1:4:40

25	VPN Concentrators: Cisco ASA, Juniper SRX	4	
26	Network Intrusion Detection/Prevention Systems (NIDPS): Cisco IDS, Juniper IDP	4	
27	Security Information and Event Management (SIEM) System	2	
28	Cisco Packet Tracer	10	1:4:40
28	GNS3	10	1:4:40
30	Wireshark	10	1:4:40
	Compliance Management Tools		
31	Splunk	1	
32	ELK Stack	1	
	Network Forensics Tools		
33	TCPdump	2	
34	Network Miner	2	
	Network Penetration Testing Tools		
35	Metasploit	1	1:40:40
36	Burp Suite		
37	ZAP	1	
	Network Configuration Management Tools		
38	Ansible	1	
39	SolarWind	1	
40	Cisco Works	1	
	Cloud Computing Platforms		
41	Amazon Web Services (AWS):	1	
42	Microsoft Azure	1	
43	Google Cloud Platform	1	
	Virtualization Software		
44	VMware vSphere	1	
45	Microsoft Hyper	1	
46	VirtualBox	1	
	Network Simulation Tools		

47	Cisco Packet Tracer	1	
48	GNS3	1	
49	Riverbed Modeler	1	
	Security Information and Event Management (SIEM) Tools & incident response		
50	ELK Stack	1	
51	IBM QRadar	1	
	Identity and Access Management (IAM) Tools		
52	AWS IAM	1	
53	Azure Active Directory	1	
54	Google Cloud IAM	1	
	Encryption Tools		
55	OpenSSL	1	
56	Microsoft BitLocker	1	
57	Cisco Encryption	1	
	Firewall Tools		
58	Cisco ASA	1	
59	Juniper SRX	1	
60	Microsoft Windows Firewall	1	
	Virtual Private Network (VPN) Tools		
61	OpenVPN	1	
62	Cisco AnyConnect	1	
63	Microsoft VPN	1	
	Compliance and Governance Tools		
64	AWS Config	1	
65	Azure Policy	1	
66	Google Cloud Compliance	1	
	Cloud Security Tools		
67	AWS Cloud Security Gateway	1	
68	Azure Security Center	1	

69	Google Cloud Security Command Center	1	
	Vulnerability Scanners		
70	Nessus	1	
71	OpenVAS	1	
72	Qualys	1	
	Security Software		
73	Antivirus Software	1	
74	Firewall Software	1	
75	Encryption Software	1	
76	Intrusion Detection/Prevention Software		
	Security Equipment		
77	Intrusion Detection/Prevention Systems (IDPS)		
78	Security Information and Event Management (SIEM) Systems	1	
	Encryption Devices		
79	Secure Sockets Layer/Transport Layer Security (SSL/TLS) Inspection Devices	1	

PRACTICAL GUIDE

	COURSE CODE	COURSE SUBJECT
1.	CNS 111 INTRODUCTION TO COMPUTER SYSTEM	Guide learners to identify different components of computer systems and peripherals
2.	CNS112 INTRODUCTION TO NETWORKING	Guide learners to identify different types of network cables, network devices and working tools
3.	CNS121 COMPUTER HARDWARE AND SOFTWARE	● Guide learners to identify different components of computer systems and peripherals. ● Guide learners to identify different types of system software and application packages
4.	CNS122 HEALTH AND SAFETY IN NETWORKING	Theories
5.	CNS131 NETWORK SECURITY MEASURES 1	● Guide learners to Install and configure a firewall on a network device ● Guide learners Create a set of firewall rules to allow or block traffic based on source and destination IP addresses, ports, and protocols
6.	CNS211 NETWORK SECURITY MEASURES II	● Guide learners to Install and configure an encryption protocol (e.g. SSL/TLS, IPsec, or PGP) on a network device (e.g. server or router) ● Guide learners to Generate and install encryption keys and certificates ● Guide learners to Configure the encryption protocol to encrypt and decrypt traffic ● Guide learners to Test the encryption protocol to ensure it is working as expected
7.	CNS212 NETWORK SECURITY RESEARCH AND DEVELOPMENT	● Guide learners to Identify a network security threat (e.g. phishing, ransomware, etc.) ● Guide learners to Create a threat model to describe the threat, including its goals, motivations, and tactics ● Guide learners to Develop a mitigation plan to prevent or minimize the impact of the threat ● Guide learners to Test the mitigation plan using a network simulation or modeling tool (e.g. NS-3, OMNeT++
8.	CNS 222 NETWORK OPTIMIZATION	● Guide learners to Use a network traffic analysis tool (e.g. Wireshark, Tcpdump) to capture and analyze network traffic. ● Guide learners to Identify the types of traffic on the network (e.g. HTTP, FTP, SSH).

		● Guide learners to Analyze the traffic patterns and identify any bottlenecks or areas for optimization. ● Guide learners to Use the analysis to optimize network traffic and improve performance.
9.	CNS231 CLOUD AND IOT SECURITY	● Theories
10.	CNS 311 CLOUD NETWOEKING	● Guide learners to Create a cloud account with a provider such as Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform (GCP). ● Guide learners to Set up a virtual private cloud (VPC) or a virtual network (VNet) in the cloud provider's portal. ● Guide learners to Configure the VPC or VNet to include subnets, route tables, and security groups. ● Guide learners to Launch a virtual machine (VM) or an instance in the VPC or VNet
11.	CNS 312 NETWORK SECURITY AND THREAT INTELLIGENCE	● Guide learners to Conduct a network security assessment to identify vulnerabilities and weaknesses in a network. ● Guide learners to Use tools such as Nmap, Nessus, or OpenVAS to scan for open ports, services, and operating systems. ● Guide learners to Analyze the results to identify potential security risks and prioritize remediation efforts. ● Guide learners to Develop a plan to remediate the identified vulnerabilities and implement security controls to prevent future attacks.
12.	CNS 321 NETWORK SECURITY GOVERNANCE AND COMPLIANCE	● Guide learners to Develop a network security policy that outlines the organization's security goals, objectives, and procedures. ● Guide learners to Identify the key stakeholders and their roles and responsibilities in implementing the policy. ● Guide learners to Determine the scope of the policy and the types of data and systems that are covered. ● Guide learners to Develop a plan to review and update the policy on a regular basis.
13.	CNS322 NETWORK SECURITY	● Guide learners to Conduct a network security risk assessment to identify potential vulnerabilities and threats to the organization's network and systems.

	RISK MANAGEMENT AND INCIDENT RESPONSE	● Guide learners to Identify the key assets and data that need to be protected, such as sensitive customer information or intellectual property. ● Guide learners to Develop a risk assessment report that outlines the potential risks and threats, as well as recommendations for mitigating them. ● Guide learners to Present the report to stakeholders and discuss the findings and recommendations.

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