

SPECIALTY: NETWORKS AND SECURITY (NWS)**OPTION: NETWORKS AND SECURITY (NWS)****PAPER: CADE STUDY**

PAPER	CADE STUDY		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written practical	05 hours	NWS18	12

Objectives: Case study involves networking systems in the industrial environment or/and tertiary. The structure of the paper must look like a true project that the candidate can meet in the enterprise. Therefore, the candidate should be able to be acquainted with the technical language associated with the main activities that can be assigned to him as:

- Study of the projects
- Propose a network architecture
- Putting into place an addressing plan
- Establish routing tables
- Choose the networking services to be deployed
- Putting into place a security policy

Format of the Exam: The Case study paper should be organized into three (03) sections as indicated in the table below:

EXAM PAPER	OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATION PER SECTION	MARK ALLOCATED	PERCENTAGE	CONCERNED COURSES
CASE STUDY	NETWORK AND SECURITY	SECTION A : Networking	1H30mn	10	25	-Introduction to Networks -Interconnecting CISCO Networking Devices II - Scaling Networks - Connecting Networks
		SECTION B:Adminstratio n	2H00	20	50	-Network Administration -Linux Network administration
		SECTION C: Security	1h30mn	10	25	-Network Security I -Network Security II
Total			5h	40	100	

SECTION A: Networking (weight = 25%, 10mks/40, 1H30mins)

The questions in this section should be based on evaluating candidates on the following:

- General concepts of networking (types of networks, topologies, architecture, interconnection etc...)

- Routing, administration and security
- Internet technology (TCP/IP model, supervision elements)
- Old technology (basic notions on Lifi, IPv6, AC norm on Wifi)

SECTION B: Administration (*weight = 50%, 20mks/40, 2H*)

The questions in this section should be based on evaluating candidates on the following:

- Configuration of a server
- Services configuration

SECTION B: Security(*weight = 25%, 10mks/40, 1H30mins*)

The questions in this section should be based on evaluating candidates on the fundamentals of networking. The exercises should involve:

- Propose a security plan for the study network

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and questions in each section
- The total number of pages of the paper

PAPER: ELECTRONIC CIRCUITS

PAPER	Electronic circuits		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written	04 hours	NWS16	05

OBJECTIVES: The aim of the electronic paper is to evaluate the abilities of the candidate to understand and analyze electronic circuits used in telecommunications.

FORMAT OF THE EXAM: This paper comprises 4 sections of equal weight whose contents are taken from the following courses:

EXAM PAPER	SPECIALITY/ OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATION PER SECTION	MARK ALLOCATED	PERCENTAGE	CONCERNED COURSES
Electronic circuits	NWS	SECTION A: Circuit analysis	45min	10	25	Circuit theory 1 Circuit theory 2
		SECTION B: Analogue circuits	1H15min	10	25	Analogue electronics1 Analogue electronics 2
		SECTION C: Digital circuits	1H00min	10	25	Digital electronics1 Digital electronics 2
		SECTION D: Telecom system electronics	1H00min	10	25	Electronic functions Telecom systems electronics
		Total	04H	40	100	

SECTION A: Circuit analysis (weight = 25%, 10mks/40, 45min)

This section comprises **one (01) exercise or problem** in which the candidate should carry out the analysis of one of the following circuits:

- Network theorems applied to dc circuits containing either independent sources, dependent sources or both
- Sinusoidal steady state analysis

SECTION B: Analogue circuits (weight = 25%, 10mks/40, 1H15min)

This section comprises **one (01) exercise or problem** based on any of the following topics:

- Diode circuit (zener regulated power supplies, diode clipping or clamping circuits)
- Transistor small signal amplifiers (either BJT or FET)
- Linear Op-amp circuits

SECTION C: Digital circuits (weight = 25%, 10mks/40, 1H00min)

This section comprises **one (01) exercise or problem** in which the candidate will either design or analyze of one of the following logic circuit:

- Adder or subtractor
- Comparators
- Encoder or decoder
- Multiplexer or demultiplexer

- Registers
- Counters or decounters

SECTION D: Telecom system electronics (*weight = 25%, 10mks/40, 1H00min*)

This section comprises one **(01) exercise or problem** in which the candidate will either design or analyze one of the following logic circuit:

- Filters (either 1st order or 2nd order, passive or active)
- Oscillators (either sinusoidal or non-sinusoidal)
- AM or FM Modulation or demodulation circuits
- Power amplifiers

NOTICE: The paper should contain the following elements:

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- The total number of pages of the paper

PAPER : SIGNAL PROCESSING

PAPER	Signal processing		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
<i>Written</i>	<i>03 hours</i>	<i>NWS17</i>	<i>05</i>

OBJECTIVES: The aim of the signal processing paper is to evaluate the abilities of the candidate to explain the characteristics of signals and the basic techniques used to process analogue and digital signals.

FORMAT OF THE EXAM: This paper comprises 3 sections whose contents are taken from the following courses:

EXAM PAPER	SPECIALIT Y/ OPTION	DIFFERENT SECTIONS OF THE PAPER	DURATIO N PER SECTION	MARK ALLOCA TED	PERCENTAGE	CONCERNED COURSES
SIGNAL PROCESSING	NWS	SECTION A: Fundamentals of signals	30min	10	25	Signals and systems
		SECTION B:Analogue signal processing	45min	14	35	Signal processing 1
		SECTION C:Digital signal processing	45min	16	40	Signal processing 2
Total			03H	40	100	

SECTION A: Fundamentals of signals (weight = 25%, 10mks/40, 30min)

This section comprises one (01) exercise in which the candidate is evaluated on the fundamentals of analogue and digital signals. The exercise should involve at least three of the following topics.

- Graphical representation of signals
- Classification, properties and units of signals and systems
- Fourier series
- Amplitude and phase spectrum of signals
- Laplace transforms
- Sampling theorem

SECTION B: Analogue signal processing (weight = 35%, 14mks/40, 45min)

This section comprises one **(01) exercise** in which the candidate is evaluated on the processing techniques applicable to analogue signals. The exercise should involve at least two of the following topics:

- Fourier transforms
- Amplitude and phase spectrum of signals
- Analogue filters design or analysis

SECTION C: Digital signal processing (weight = 40%, 16mks/40, 45min)

This section comprises one **(01) exercise** in which the candidate is evaluated on the processing techniques applicable to digital signals. The exercise should involve at least two of the following topics:

- Z-transforms
- Discrete Fourier transform
- Digital filters design or analysis
- Encoding
- Applications on compressing (audio, video)

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and questions in each section
- The total number of pages of the paper

PAPER: CISCO NETWORKING

PAPER	CISCO NETWORKING		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written	04 hours	NWS19	06

Objectives: This paper has as main objective to test the student understanding on CISCO networking. Students are expected to prove a good mastering of OSI and TCP/IP models. The different network devices, their interconnection and protocols intervening in each layer shall also be tested.

Format of the Exam: This paper contains four (4) sections of equal weight. Each section should contain two sub sections. Sub section 1 made up of 5 MCQs; Sub section 2 made up of dependent or independent structural questions. MCQ questions make up 20% of each section

Exam paper	Specialty/ Option	Different sections of the paper		Duration per section	Mark allocated	Percentage	Concerned courses
CISCO NETWORKING	NWS	SECTION A: CISCO 1	A1: 05 MCQs	10min	5mks	5%	CISCO 1: Introduction to computer Networks
			A2: Structural questions	50min	20mks	20%	
		SECTION B: CISCO 2 and CISCO 3	B1: 05 MCQs	10min	5mks	5%	CISCO 2 , CISCO 3
			B2: Structural questions	50min	20mks	20%	
		SECTION C: CISCO 2 and CISCO 3	C1: 05 MCQs	10min	5mks	5%	CISCO 2 , CISCO 3 (Routing)
			C2: Structural questions	50min	20mks	20%	
		SECTION D: CISCO 4	D1: 05 MCQs	10min	5mks	5%	CISCO 4 (WAN)
			D2: Structural questions	50min	20mks	20%	
Total				4h	100	100	

SECTION A: Introduction to computer Networks

The questions of this section are to be taken from the course CISCO 1 and cover the following parts:

- Fundamentals knowledge on protocols and communication
- Physical and data link layer(ethernet)
- IP addressing and subnetting
- Transport layer protocols

SECTION B: Switching in computer networks

The questions of this section should be based on switching and taken from both CISCO 2 and CISCO 3. Indeed the following abilities of the candidate are to be evaluated:

- Choice and configuration of a switch
- Switch forwarding of frames
- VLAN
- STP
- Etherchannel and HSRP

SECTION C: Routing in computer networks

The questions of this section should be based on routing and taken from both CISCO 2 and CISCO 3. Indeed the following abilities of the candidate are to be evaluated:

- Configuration and implementation of dynamic and static routing con
- Understanding and configuration of routing protocols (EIGRP,OSPF)
- Understanding and configuration of NAT and DHCP

SECTION D: Wide Area Networks

The questions of this section should be based on WAN networks and taken from both CISCO 4 program. The following abilities of the candidate are to be evaluated:

- Implementation of point-to-point Connections
- Configuration of Access Control Lists
- Implementation of a network security and monitoring policy
- Management of the quality of Service (delay and jitter)

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and questions in each section
- The total number of pages of the paper

PAPER: INFORMATION SECURITY

PAPER	INFORMATION SECURITY		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written	04 hours	NWS21	03

Objectives of the paper: Evaluate the capability of the candidate to plan and implement an efficient network security policy in either local, metropolitan or wide area networks.

Format of the Exam paper: The information security paper should be organized into three (03) sections as indicated in the table below:

Format of the Exam: This paper contains four (4) sections of equal weight. Each section should contain two sub sections. Sub section 1 made up of 5 MCQs; Sub section 2 made up of dependent or independent structural questions. MCQ questions make up 20% of each section

Exam paper	Speciality/ Option	Different sections of the paper		Duration per section	Mark allocated	Percentage	Concerned courses
INFORMATION SECURITY	NWS	SECTION A: Network security	A1: 20 MCQs	40min	10mks	10%	- Network security 1 - Network security 2 - Network security 3
			A2: 4 Structural questions	1H20min	40mks	40%	
		SECTION B: Network administration and security	B1: 20 MCQs	40min	10mks	10%	- Network administration security 1 - Linus network administration
			B2: 4 Structural questions	1H20min	40mks	40%	
Total				4h	100	100	

SECTION A: Network security

The questions of this section are to be taken from the course network security 1, 2 and 3 and should cover at least 70% the following parts:

- Review of Networking Fundamentals
- Network Security Concepts
- Attacks to Networks and Counter measures
- World Wide Web and Internet Security
- Encryption Mechanisms for Network Operations.
- Security Protocols
- Intrusion Detection and Prevention Systems
- Organizational Security Issues
- Modeling network security and adversaries
- Security of Internet infrastructure

- Web security: TLS, HTTP authentication, XSS, CSRF and other exploits
- Security of broadcast systems

SECTION B: Network administration and security

The questions of this section are to be taken from the course network administration and security 1, and Linux network administration. The questions should evaluate at least 70% of the following capabilities:

- Installation of a Windows server
- Identify application servers
- Understand web services
- Understand remote access
- Understand file and print services
- Understand server virtualization
- Management of groups infrastructure and policy
- Storage technologies and scenarios
- Troubleshooting methods
- Linux system (characteristics, architecture, main commands...)
- Linux system administration commands

NOTICE: The paper should contain the following elements.

- A marking guide with marks allocation in both sections and questions in each section
- The total number of pages of the paper

PAPER : TELEPHONY AND SWITCHING SYSTEMS

PAPER	TELEPHONY AND SWITCHING SYSTEMS		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
Written	02 hours	NWS22	03

Objectives of the paper: Evaluate the candidate's ability to understand voice traffic over the conventional telephone networks and over IP Networks.

Format of the Exam paper: The **Telephony and switching systems paper** should be organized into two (02) sections as indicated in the table below:

Exam Paper	Option	Different sections of the paper	Duration per section	Mark allocated	Percentage	Concerned Courses
TELEPHONY AND SWITCHING SYSTEMS	NETWORKS AND SECURITY	SECTION A: Telephony (PSTN/ISDN)	1H	20	50	Telephony and switching
		SECTION B: IP Telephony	1H	20	50	Telephony on IP
TOTAL			2h	40	100	

SECTION A: Telephony (PSTN/ISDN)(weight = 50%, 20mks/40, 1H)

The questions of this section should be based on Telephony. The following abilities of the candidate are to be evaluated:

- General Principles of Telephony
- Architecture of Public and private telephone networks
- Private telephone network (Signaling, cabling norms, services)
- Switching Hierarchy

SECTION B: IP Telephony (PSTN/ISDN)(weight = 50%, 20mks/40, 1H)

The questions of this section should be based on IP Telephony. The following abilities of the candidate are to be evaluated on:

- Norms, Protocols and voice over IP Telephony
- Equipment
- security in IP Telephony

NOTICE: The paper should contain the following elements:

- A marking guide with marks allocation to both sections and questions in each section
- The total number of pages of the paper

PAPER : PRACTICE OF NETWORK ADMINISTRATION, SUPERVISION AND SECURITY

PAPER	PRACTICE OF NETWORK ADMINISTRATION, SUPERVISION AND SECURITY		
TYPE OF PAPER	DURATION	PAPER CODE	CREDITS
<i>Written</i>	<i>04 hours</i>	<i>NWS23</i>	<i>06</i>

Objectives of the paper: Practice of networking administration, supervision and security takes place in the networking laboratory. This paper evaluates the candidate's ability to install, supervise and secure a networking operating system and to configure networking services. The paper will contain:

- A question paper for the candidate
- The material needed for the manipulation

Format of the Exam: The Practice of networking administration, supervision and security paper should be organized into three (03) sections as indicated in the table below:

Exam Paper	Option	Different sections of the paper	Duration per section:	Mark allocated	percent age	Concerned Courses
Practice of Networking administration and Security	NWS	SECTION A: Preparation	1h	12	25	-Networking fundamentals
		SECTION B: Manipulation	2h00mn	20	50	-Networks and Security 1 -Networks and Security 2
		SECTION C: Technical Report	1h	08	20	-Technical Report writing
TOTAL			4h	20	100	