UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

END OF SEMESTER ONE EXAMINATIONS

ACADEMIC YEAR 2025/2026

DEPARTMENT:	**ICT**
YEAR OF STUDY:	**TWO**
PROGRAMMES:	**DIPLOMA IN ELECTRONIC COMMUNICATION ENGINEERING (DECE)** **DIPLOMA IN COMPUTER SCIENCE (DCS)**
COURSE:	**DATA COMMUNICATION & NETWORKING**
COURSE CODE:	**ECE214**
DATE:	**THURSDAY 11TH DECEMBER, 2025**
TIME:	**02:00 PM – 05:00 PM**
DURATION:	**3 HOURS**

INSTRUCTIONS:

(a) **This paper consists of two sections A and B**
(b) **Section A carry 40 marks and is compulsory**
(c) **Attempt any THREE questions from section B**
(d) **Any number in section B carry equal marks**
(e) **Credit will be given for use of relevant examples and illustrations**
(f) **Begin each number on a new page of the answer sheet**

SECTION A [40 MARKS]
Attempt ALL the Questions in this section.

Part I:

This Part consists of 15 Multiple Choice Questions.

List numbers vertically from 1 to 15 in the answer booklet.

Write a letter corresponding to the best answer to each of the questions.

1. A network that connects computers in a single building, like a school, is called a ……..
   A. WAN B. LAN C. MAN D. VLAN
2. Which of these devices is used to connect different networks together and direct traffic between them?
   A. Hub B. Switch C. Router D. Repeater
3. Which of these cable types uses light to transmit data and is immune to electrical interference?
   A. Coaxial Cable B. Twisted-Pair Cable C. Fiber Optic Cable D. Ethernet Cable
4. In a network, if one computer sends a message and all other computers on the network receive it. This is called ……..
   A. Unicast B. Multicast C. Broadcast D. Simplex
5. The OSI model has how many layers?
   A. 4 B.5 C. 7 D. 9
6. Which layer of the OSI model is responsible for physically transmitting raw bits over a medium?
   A. Data Link Layer B. Network Layer C. Transport Layer D. Physical Layer
7. Which protocol is used to send emails from a client to a mail server?
   A. POP3 B. IMAP C. HTTP D. SMTP
8. What does the acronym **TCP** stand for?
   A. Transmission Control Protocol B. Transmission Communication Protocol
   C. Transfer Control Protocol D. Transfer Communication Protocol
9. Which of these is a private IP address range?
   A. 192.168.1.1 B. 8.8.8.8 C. 172.217.16.206 D. 203.0.113.10
10. The main purpose of a Network Interface Card (NIC) is to ……..
    A. block viruses B. connect a computer to a network
    C. increase internet speed D. store web pages
11. Which network topology connects all devices to a central device like a switch?
    A. Bus Topology B. Ring Topology
    C. Star Topology D. Mesh Topology
12. Which of these types of communication allows data to flow in both directions at the same time?
    A. Simplex B. Half-Duplex C. Full-Duplex D. Broadcast
13. The primary function of a DNS server is to …….
    A. assign IP addresses B. protect the network from attacks
    C. translate domain names to IP addresses D. send and receive emails
14. Which of these cables would you typically use to connect a computer directly to a router?
    A. Crossover B. Rollover C. Coaxial D. Straight-through
15. The process of adding addressing information as data moves down the OSI layers is called …..
    A. Encoding B. Encapsulation C. Segmentation D. Signalling

Each question carries 1 mark. **(15 marks)**

Part Ii:

This Part consists of Real-world situation.

Read each carefully and answer the questions based on your knowledge of networking concepts.

16. A new start-up with 10 employees is setting up its first office. They need a network to share files and a printer and to connect to the internet. They have asked you for advice.
    (a) Would you recommend a Client-Server or a Peer-to-Peer network for them?
    (b) Justify your choice by giving one reason. **(3 marks)**
17. Your friend calls you, frustrated that they cannot connect to the internet. Their laptop shows **Limited Connectivity** warning. You ask them to run a command, and they tell you their IP address is 169.254.xx.xx.
    What does the 169.254.xx.xx IP address likely indicate, and which network protocol (TCP, UDP, DHCP, DNS, etc) has probably failed? **(3 marks)**
18. You are working in a coffee shop using their public Wi-Fi. You can browse websites, but when you try to access your company's internal file server using its private IP address (192.168.1.100), you cannot connect.
    Explain why this connection fails.
    Name the type of network your company's server is on and the key device (hub, switch, router, modem, etc) that prevents this connection from being established over the public coffee shop Wi-Fi. **(3 marks)**
19. You are in a video conference call with your team. You are speaking and sharing your screen while also seeing and hearing your teammates.
    Identify the type of data transmission (simplex, half-duplex, full-duplex) that this video call uses. Explain your answer. **(3 marks)**
20. A junior technician is looking at a network diagram that shows a central device with multiple computers connected to it by individual cables. One cable has failed, but only one computer has lost its network connection.
    (a) What is the name of this network topology?
    (b) What is the central device shown in the diagram likely to be? **(3 marks)**
21. Imagine you are setting up a small home network to share an internet connection and a printer between two laptops.
    (a) List **three essential** hardware devices you would need. **(3 marks)**
    (b) Name **one protocol** that would be using for sending emails and one for browsing websites on this network. **(2 marks)**

22. The table below has protocols with numbers 1 to 5 and functions with letters A to E .

Protocol	Function
1. DHCP	A. Translates a website name to an IP address.
2. FTP	B. Provides reliable, connection-oriented data delivery.
3. TCP	C. Automatically assigns IP addresses to devices.
4. DNS	D. Sends and receives files between computers.
5. HTTP	E. Delivers web pages from a server to a client.

Match the protocols to their primary function, by writing a letter of function against a number of protocol. **(5 marks)**

SECTION B [60 MARKS]
Attempt Only Three Questions in this section.

Question 1

A student in the lab reports that their computer cannot access the internet.

(a) List **any four simple checks** you would do first before changing configurations. **(8 marks)**
(b) State **two reasons** why a loose or damaged cable can cause loss of connection. **(4 marks)**
(c) Describe how the **ping command** helps in troubleshooting. **(4 marks)**
(d) Give **two reasons** why restarting a router or computer, sometimes fixes network problems. **(4 marks)**

Question 2

(a) State the purpose of each of these protocols in a network:
(i) DHCP (ii) DNS (iii) HTTP (iv) SMTP **(8 marks)**
(b) You are required to create a small office network simulation in Packet Tracer. Outline the steps for creating a wired LAN consisting of **five devices** connected by a router and switch, including addressing and interface configuration. **(8 marks)**
(c) Describe any test you would perform in Packet Tracer to confirm correct end-to-end connectivity. **(4 marks)**

Question 3

A home network uses the 192.168.0.0/24 range. The owner wants to create two separate networks for the main house and a guest house.

(a) What is the new subnet mask, in dotted decimal format **(6 marks)**
(b) List the network and broadcast addresses for the two resulting subnets. **(4 marks)**
(c) List **three types** of wireless communication media. **(3 marks)**
(d) State **two** advantages of each of twisted-pair and fiber optic cables **(4 marks)**
(e) Identify **any three** main functions of a gateway in a network. **(3 marks)**

Question 4

(a) Illustrate a star topology, with a simple diagram. **(5 marks)**

(b) Differentiate between circuit switching and packet switching. **(5 marks)**

(c) (i) Explain the client-server model.

(ii) Briefly describe the role of a DNS server. **(6 marks)**

(d) (i) What is a VLAN?

(ii) Give one benefit of a VLAN. **(4 marks)**

Question 5

(a) (i) Give **two reasons** why a switch is better than a hub.

(ii) Differentiate between a switch and a bridge. **(4 marks)**

(b) (i) Convert IPv4 address from dotted decimal 192.168.10.1 to binary format.

(ii) Differentiate between IPv4 and IPv6 addresses. **(8 marks)**

(c) (i) Give **one example** of application layer protocol used for email.

(ii) What is its specific function? . **(4 marks)**

(d) Explain the de-encapsulation process as data moves up OSI layers. **(4 marks)**

END