UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
END OF SEMESTER ONE EXAMINATIONS

ACADEMIC YEAR 2024/2025

DEPARTMENT: ICT

SEMESTER: ONE

PROGRAMME(S): DIPLOMA IN COMPUTER FOR SCIENCE (DCS)
DIPLOMA IN INFORMATION TECHNOLOGY FOR BUSINESS (DITB)
DIPLOMA IN ELECTRONICS COMMUNICATION ENGINEERING (DECE)

YEAR OF STUDY: TWO

COURSE: DATA COMMUNICATION AND NETWORKING

COURSE CODE : ECE211

DATE: TUESDAY 16TH, DECEMBER 2024

TIME: 2:00 PM – 5:00 PM

DURATION: 3 HOURS

INSTRUCTIONS:

(i) This paper contains two Sections: A (40 marks) & B (60 marks).

(ii) Attempt ALL questions in Section A, and ONLY THREE questions in Section B.

(iii) All questions in Section B carry equal marks.

(iv) Credit will be given for use of relevant examples and illustrations.

(v) Begin each number in Section B on a new page of the answer sheet.

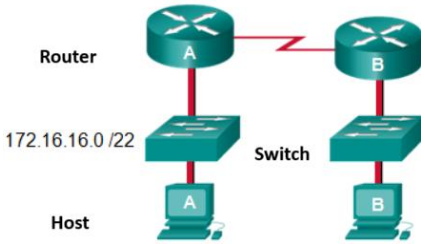
SECTION A [40 MARKS]

Attempt ALL questions in this section

Write the correct alternative in the answer booklet provided (2 marks @)

SECTION AI

1. You have a Class B addressing space with a subnet mask of /24. How many subnets are created from the original Class B addressing space?
   A. 4096 B. 2048 C. 128 D. 512 D. 1024 E. 256
2. You are given an IP address of 172.16.3.0/23. What is the usable range of addresses within this subnet?
   A. 172.16.0.0 to 172.16.4.254 B. 172.16.1.0 to 172.16.3.254
   C. 172.16.3.1 to 172.16.4.254 D. 172.16.2.1 to 172.16.3.254
3. An administrator must send a message to everyone on the router A network. What is the broadcast address for network 172.16.16.0/22?



   A. 172.16.16.255
   B. 172.16.20.255
   C. 172.16.19.255
   D. 172.16.23.255
   E. 172.16.255.255

4. At which two layers of the OSI model does a WAN operate? (Choose two)
   A. Physical Layer B. Data Link layer C. Network Layer
   D. Presentation Layer E. Transport Layer
5. Which statement describes a characteristic of a WAN?
   A. A WAN operates within the same geographic scope of a LAN but has serial links.
   B. A WAN provides end-user network connectivity to the campus backbone.
   C. All serial links are considered WAN connections.
   D. WAN networks are owned by service providers.
6. The _____sub-layer is responsible for the flow control and error control in OSI model
   A. Physical Access Control (PAC) B. Medium Access Control (MAC)
   C. Logical Link Control (LLC) D. Medium Physical Control (MPC)
7. What is the most compressed representation of the IPv6 address?
   2001:0000:0000:abcd:0000:0000:0000:0001?
   A. 2001:0:abcd::1 B. 2001:0:0:abcd::1 C. 2001::abcd::1
   D: 2001:0000:abcd::1 E. 2001::abcd:0:1
8. In an optical fibre the inner core is _____ the cladding.
   A. denser than B. the same density as
   C. less than dense D. another name for
9. In an electrical noisy environment, the best transmission medium would be _____
   A. unshielded twisted pair B. optical fibre
   C. coaxial cable D. the atmosphere
10. The portion of physical layer that interfaces with the media access control sublayer is called
    A. physical signalling sublayer B. physical data sublayer

C. physical address sublayer D. none of the mentioned

SECTION A II

1. State the layer of the OSI model that controls the reliability of communications between network devices using flow control, sequencing and acknowledgments **(2 marks)**
2. Which term refers to a network that provides secure access to the corporate offices by suppliers, customers and collaborators **(2 marks)**
3. Which procedure is used to reduce the effect of crosstalk in UTP cables **(2 marks)**
4. Explain the functions of CSMA/CD and CSMA/CA in data communication **(4 marks)**
5. What is responsible for resolving an IP address to the MAC address of the receiving host **(2 marks)**
6. What is the length limitation of a UTP cable run from a telecommunications closet to a networking device in a work area? **(2 marks)**
7. Explain why hubs have become history (out of date) in data communication **(2 marks)**
8. List the **two** sublayers that make up the Data Link layer **(2 marks)**
9. State **two** disadvantages of star topology in data networks **(2 marks)**

SECTION B [60 MARKS]

Attempt **ONLY THREE** Questions in this Section.

Question 1

a) Define data communication **(1 mark)**
b) List any **three** external factors that can affect the quality of data communication **(3 marks)**
c) Draw and describe the data transmission modes in computer networks **(6 marks)**
d) Assume you have been requested by your employer to setup a data communication network.
   i) Identify some of the challenges you expect to face during the operation of the network. **(5 marks)**
   ii) Explain how you will over these challenges **(5 marks)**

Question 2

a) Explain the following networks as applied to data network **(2 marks @)**
   i) Adhoc
   ii) Wimax

b) LAN (Local Area Network) is a data communication network that locally connects network devices such as workstations, servers, routers, etc. to share the resources within a small area such as a building or campus. Physical or wireless media are set up between workstations to share the resources. Assume you have been tasked to set up a local area network.
   i) List **four** factors that will help you in selecting an appropriate network media for your network **(4 marks)**
   ii) State **four** types of physical topologies you will consider for your network **(4 marks)**
   iii) Give the reasons for the choice of the topology in a(ii) **(4 marks)**
   iv) Explain why you would prefer to use a guided medium in your LAN **(4 marks)**

Question 3

a) List **three** advantages of layering in OSI reference model **(3 marks)**
b) Differentiate between physical and logical addresses in TCP/IP model **(4 marks)**
c) Explain the functions of the OSI reference model **(7 marks)**
d) Describe the causes of transmission impairments in a data transmission medium/channel **(6 marks)**

Question 4

a) Outline the importance of subnetting in data communication **(8 marks)**
b) You are working for a company that will be using the 192.168.1.0/24 private IP address space for IP addressing inside their organization. The company has multiple geographical distant branches and want to carve up the 192.168.1.0/24 address space into subnets. Their largest subnet will need 13 hosts. Determine:
   i) the IP address for each subnet. **(4 marks)**
   ii) The broadcast IP for each subnet **(4 marks)**
   iii) The range of the useable IP addresses per subnet **(4 marks)**

Question 5

a) Define WAN switching **(2 marks)**
b) Explain the following terms as applied to WAN switching techniques
   i) Circuit Switching **(4 marks)**
   ii) Packet switching **(4 marks)**
   iii) Message switching **(4 marks)**
c) Outline the way in which dynamic switching improves the efficiency of a network **(2 marks)**
d) State **two** advantages and **two** disadvantages of circuit switching **(4 marks)**