BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE

BSc HONS DEGREE IN COMPUTER SCIENCE/INFORMATION TECHNOLOGY /NETWORK ENGINEERING/SOFTWARE ENGINEERING

CS212/CSH201/NWE204/SWE215 DATA COMMUNICATIONS AND NETWORKING

2 HOURS 30 MINUTES

INSTRUCTION TO CANDIDATES

JUN 2025

Answer all questions.
Each question carries 20 marks. Total marks are 100.

Question 1

a. Describe the function of the following components of communication network
   i. Hub. [2]
   ii. Switch. [2]
   iii. Router. [2]
   iv. Bridge. [2]
   v. Modem. [2]
   vi. Broadband. [2]

b. Describe the four fundamental characteristics of data communication. [8]

Question 2

a. Fiber optic networks are replacing copper networks at a rapid rate. Why is this happening, and what are the benefits of using Fiber optic networks for telecommunication companies ? [8]

b. Signals travel through transmission media, which are not perfect. The imperfection causes signal impairment. This means that the signal at the beginning of the medium is not the same as the signal at the end of the medium.

What is sent is not what is received. Explain the three causes of impairment. [6]

c. Describe three types of transmission modes used in data communication. [6]

Question 3

a) A company with three departments has been allocated a network address 148.16.0.0/16 by its Internet Service Provider. They intend to create a subnet for each department.

i. How many bits of the host part should be used to create the three subnets? [1]

ii. Create the subnets specifying the network address, host range and broadcast address for each subnet. [9]

b) Ethernet supports a protocol known as Carrier Sense Multiple Access with Collision Detection (CSMA/CD). Explain how CSMA/CD works, giving an example of how it ensures a low probability of collision when two nodes attempting to transmit at the same time. [10]

Question 4

a) With the aid of a diagram describe the OSI Model [14]

b) There are two approaches to gathering and using routing information:

i. Distance-vector routing

ii. Link-state routing

Compare the two approaches by describing the routing information used and the way the routing algorithm works. [6]

Question 5

a. Explain the difference between symmetric encryption and asymmetric encryption [4]

b. Virtual private networks(VPNs) are widely being implemented in modern communication networks, Describe the benefits of using VPNs. [6]

c. Describe the role of a firewall and outline how it is implemented in a communication network. [4]

d. In the development of Wi-Fi network protocols security, upgrades were made from WEP to WPA1 and then WPA2. Describe the improvements that were done in these upgrades. [6]

*** END OF EXAM******