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**UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS  
YEAR FOUR SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE OF  
BACHELOR OF COMPUTER SCIENCE**

**COURSE CODE : CSC 470E**

**COURSE TITLE : NETWORK PROTOCOLS &  
STANDARDS**

**DATE: 21/04/2023**

**TIME: 2:00 P.M – 4:00 P.M.**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

### QUESTION ONE (COMPULSORY) [30 MARKS]

- a) Differentiate between the following as used in computer networks.
- i. Protocol Data Unit (PDU) and Service Data Unit (SDU) [2 marks]
  - ii. Static and dynamic routing. [2 marks]
- b) Use the definitions or any other discussion to illustrate the fundamental difference between a Service and a Protocol. [3 marks]
- c) Describe the concept of transparent bridging as used in layer 2 switching process. [3 marks]
- d) Outline the four functions of layer 3 devices in a network. [3 marks]
- e) What are the main causes of LAN traffic congestion? [3 marks]
- f) An IPv4 packet has arrived with the first 8 bits as shown: 01000010. The receiver discards the packet. Explain why? [2 marks]
- g) Find the class of each address.
- i. 00000001 00001011 00001011 11101111 [1 mark]
  - ii. 11000001 10000011 00011011 11111111 [1 mark]
  - iii. 14.23.120.8 [1 mark]
  - iv. 252.5.15.111 [1 mark]
- h) Kibabii University network administrator has chosen a possible subnet mask for his/her network and need to determine the number of subnets, number of valid hosts per subnet, valid subnets, broadcast address of each subnet, and valid hosts in each subnet. Calculate for each:
- i. A subnet mask 255.255.255.192 (/26) and network address 10.0.0.0 [4 marks]
  - ii. A subnet mask 255.255.255.192 (/20) and network address 172.16.0.0 [4 marks]

### QUESTION TWO [20 MARKS]

- a) Distinguish between the following IP terminologies.
- i. Broadcast domain and collision domain [2 marks]
  - ii. Network address and broadcast address [2 marks]

- b) Explain using an example how information about a node failure propagates using this algorithm. [6 marks]
- c) What problem is encountered in deciding whether a host has become unreachable? [5 marks]
- d) In what circumstances is it impossible to resolve the problem in (b) above? [5 marks]

### QUESTION THREE [20 MARKS]

- a) Define the following terms. [2 marks]
- i. Supernetting [2 marks]
  - ii. Subnet Mask [3 marks]
- b) What is VOIP? How is it different from PBX? [3 marks]
- c) Describe the concept underlying the use of Virtual LANs (VLANs) in a network. [5 marks]
- d) As a network designer why is it important to advise your client to implement VLANs? [4 marks]
- e) Discuss how the distance-vector routing protocols find the best path to a remote network by judging distance. [4 marks]

### QUESTION FOUR [20 MARKS]

- a) Differentiate between Network reliability and Quality of Service. [4 marks]
- b) Explain comparison of virtual-circuit and datagram networks. [5 marks]
- c) Explain Sliding Window Protocol in details. [6 marks]
- d) Explain the concept of File Transfer Protocol (FTP) and how it differs from other client/server applications. [5 marks]

### QUESTION FIVE [20 Marks]

- a) Explain the followings.
- i. Flooding [2 marks]
  - ii. Distance Vector Routing [2 marks]
  - iii. The Count-to-Infinity Problem [2 marks]
- b) Compare and contrast between SMTP and HTTP application protocols. [6 marks]
- c) Discuss the various types of multiplexing techniques implemented today. [4 marks]
- d) Discuss the concept of SONET multiplexing as used network protocols and standards. [4 marks]