

UNIVERSITY OF ESWATINI

Faculty of Science and Engineering

Department of Computer Science

SUPPLEMENTARY/RESIT EXAMINATION - JULY 2019

**Title of Paper: NETWORKS AND CODING THEORY II / COMPUTER
NETWORKS II**

Course Number: CS438/CSC432

Time Allowed: 3 hours

Instructions to candidates:

*This question paper consists of FIVE (5) questions. Answer any FOUR (4) questions
Marks are indicated in square brackets.
All questions carry equal marks (25 Marks Each).*

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THE INVIGILATOR.

QUESTION 1

a) Explain distance vector routing. What are its limitations and how are they overcome? [6]

b) Consider host IP 172.16.0.0/16 to design a network in a new office building where number of Computers (host) 100 and 6 departments (Networks). Calculate the following terms: [7]

- i. Number of Sub-Net Bits
- ii. Number of Host Bits
- iii. Total Network Bits
- iv. Maximum possible Network
- v. Maximum Valid Host/Network
- vi. Default Get way

Also write the Network address, Host IP address range and Broadcast address for every department.

c) With the help of diagrams, describe the following routing strategies:

- i) Fixed routing.
- ii) Random routing. [6]

d) Explain leaky bucket algorithm and compare it with token bucket algorithm. [6]

QUESTION 2

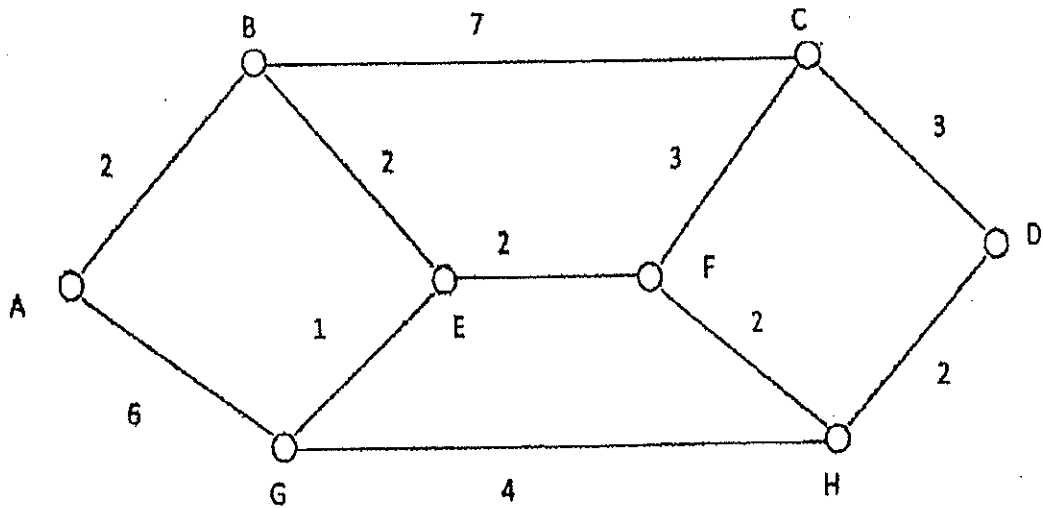
a) Distributed routing algorithms in communications systems are designed to provide a fault-tolerant computation of end-to-end paths in the event of link or router failure (or repair).

i. Describe how this occurs, using as an example the distance-vector algorithm. [4]

ii. Distance-vector routing is said to be slow to react to changes. Explain why, and outline why link-state protocols are therefore preferred in today's Internet. [5]

b) What are the pros and cons of distance vector versus link state routing protocols? [3]

c) Using Dijkstra's algorithm on the network of routers shown, find the minimum distances and routes between **node F** and all other nodes.



[8]

c) Illustrate the basic structure of an IP address. Given an IP address, how would you determine whether it is a class A, B or C address? [5]

QUESTION 3

- a) Does Webmail use POP3, IMAP, or neither? If one of these, why was that one chosen? If neither, which one is it closer to in essence? [3]
- b) What are the most important DNS records? Explain the role of a DNS (Domain Name System) Server. [6]
- c) Consider a 100,000-customer video server, where each customer watches two movies per month. Half the movies are served at 8 P.M. How many movies does the server have to transmit at once during this time period? If each movie requires 4 Mbps, how many OC-12 connections does the server need to the network? [5]
- d) Write short notes about following items:
- i. SMTP
 - ii. POP3
 - iii. Cookie
 - iv. URL [8]
- e) Distinguish between HTTP and HTTPS [3]

QUESTION 4

- a) Write down the comparison between H.323 and SIP (Session Initiation Protocol). [5]
- b) Briefly explain how Video Streaming media using Web and media Server? [7]
- c) What is the bit rate for transmitting uncompressed 800 x 600 pixel colour frames with 8 bits/pixel at 40 frames/sec? [2]
- d) What are the major differences between TCP and UDP? Why does DNS use UDP instead of TCP for the service? What is the size of a TCP header? What is the size of a UDP header? What fields exist in both TCP header and UDP header? [11]

QUESTION 5

- a) Explain briefly what is meant by confidentiality, integrity and authentication. [6]
- b) With the aid of appropriate examples explain how transposition and substitution ciphers work. [5]
- c) Compare and contrast symmetric key cryptography (typified by the use of the DES algorithm), with public key cryptography (typified by the use of the RSA algorithm). In your answer you should list the major features of these approaches, but not discuss the details of DES or RSA. [6]
- d) Briefly explain how the Domain Name Service (DNS) is implemented and how DNS queries are resolved in the DNS system. Why does the DNS have zones? [5]
- e) What are the functions of ARP and DHCP? [3]

End of Question Paper