

UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

MAIN EXAMINATION 2016

TITLE OF PAPER : NETWORKS AND CODING THEORY - II

COURSE NUMBER : CS438

TIME ALLOWED : THREE HOURS

INSTRUCTIONS : ANSWER ANY FOUR QUESTIONS.

EACH QUESTION CARRIES **25 MARKS**.

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THE INVIGILATOR.**

## QUESTION I

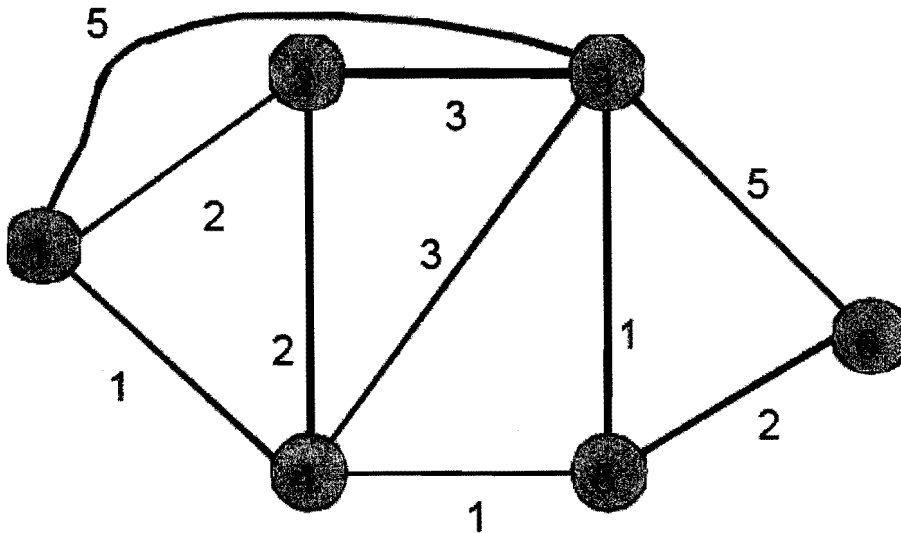
a) Explain distance vector routing. What are its limitations and how are they overcome? [6]

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) Assume node 1 has obtained the entire network topology using some link state routing protocol. Construct the routing table at node 1 using Dijkstra's algorithm to determine shortest paths from node 1 to all other nodes in the network [6]



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

## QUESTION 2

- a) What is Multiplexing? Is multiplexing at the Transport layer different from multiplexing at the Physical layer? Explain your answer. [4]
- b) Briefly explain with appropriate figure what services provided to the upper layers by Transport layer. [8]
- c) How do we regulate the sending rates to obtain a desirable bandwidth allocation? Describe with appropriate figure. [7]
- d) RTP is used to transmit CD-quality audio, which makes a pair of 16-bit samples 44,100 times/sec, one sample for each of the stereo channels. How many packets per second must RTP transmit? [4]
- e) Discuss the advantages and disadvantages of credits versus sliding window protocols. [2]

## 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 spirit? [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 note about following items: [8]
- i. SMTP
  - ii. POP3
  - iii. Cookie
  - iv. URL
- e) Distinguish between HTTP and HTTPS [3]

#### **QUESTION 4**

- a) Write down 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 color 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) What are the major goals of network security? What are the basic parts of an encryption system? [6]
- b) What is Digital Signature? Give an explanation of MD (Message Digest) Digital Signature Method. [5]
- c) Describe the RSA encryption method. [6]
- d) What is firewall? What kind of operations or function does a firewall typically perform? Write any one security threat that a firewall prevents and three different security threats that a firewall is useless against. [5]
- e) Explain the term network jitter. How does jitter affect the performance of an audio streaming application? [3]

**End of Question Paper**