UNIVERSITY OF SWAZILAND

Faculty of Science

Department of Computer Science

MAIN EXAMINATION 2008

Title of paper: **NETWORKS AND CODING THEORY – II**

Course number: **CS438**

Time allowed: **3 hours**

Instructions: Answer any 5 of the 6 questions.

QUESTION 1

a) State any two of the main services provided by the **network layer**.   [2]

b) Define, and contrast between, **central** and **distributed** routing strategies.   [6]

c) Briefly distinguish between the following **random routing** and **flooding**. Explain under what circumstances would the use of each be appropriate?   [4]

d) Given the following directed graph:
   - i)   Find the spanning tree with F as the source node. Hence construct the routing table for node F.
   - ii) Generate the distance table for node B.   [8]
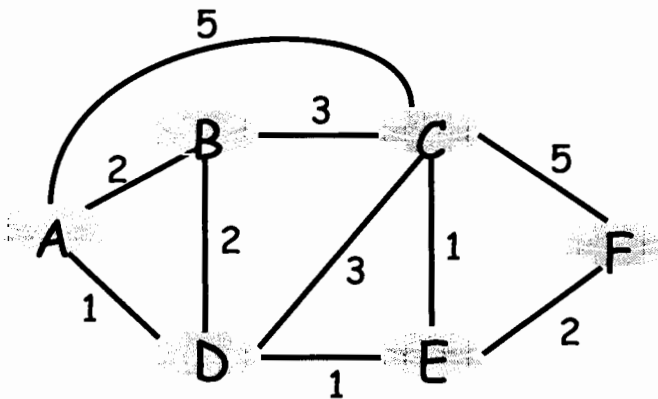

QUESTION 2

a) State any 3 parameters for measuring/monitoring congestion in a network.   [3]

b) Explain the terms **tunneling** and **Virtual Private Networks (VPNs)**.   [5]

c) Give a detailed account of the following Congestion control techniques for virtual circuit and datagram networks:
   - i   Choke packets
   - ii   Jitter control
   - iii Leaky bucket algorithm
   - iv   Load shedding/packet discarding   [12]

QUESTION 3

a) Explain the main reasons for the existence of the transport layer [4]

b) Describe the *two army problem* and explain its relevance to the releasing of connections.
[4]

c) Give an overview of the service primitives in the OSI reference model's transport layer.
[4]

d) Distinguish between TCP and UDP, explaining the kinds of applications to which each is suited. [8]

QUESTION 4

a) In the inter-network below, user A in network 1 is sending data to user B in network 2. The user produces a message that is 128KBytes long (i.e., 131,072 bytes). Suppose that the network1's MTU is 4,096 bytes and network 2's MTU is 16,384 bytes. Describe how the message will be transferred to user B over the 2 different networks. [4]
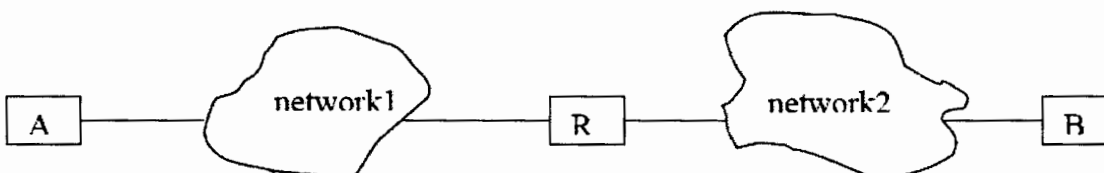
b) i) State any two examples of LAN technologies and any two examples of WAN technologies. [4]

ii) Explain how routing is achieved in inter-networks. [8]

c) Explain two ways in which a new computer attached to be attached to a LAN can be assigned an IP address? [4]

QUESTION 5

a) Explain *any four* goals of network security. [4]

b) What does "security through obscurity" mean? Is it a good or a bad idea? Why? [4]

c) Describe the main differences between DES and AES. [4]

d) Use the RSA algorithm to encrypt the letter **k** assuming p=7 and q=5. What will be the public key and the private key? Show your working. [8]

QUESTION 6

a) Describe how DNS works. [5]

b) Describe the protocol for sending a hostname-resolution query to a DNS server. [3]

c) Explain the following terms:
       i)   Cookie,
      ii)   Blog,
     iii)   Web cache [6]

d) For each of the following pairs, define the two terms and contrast between them:
   i. Mail user agent and mail transfer agent
   ii. HTTP and HTTPS (also referred to as SHTTP) [6]