

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCE**  
**MAY 2005 EXAMINATIONS**

**SUBJECT: COMPUTER NETWORKS AND APPLICATIONS**  
**CODE: SCS 4202**

**Instructions to candidate:**

1. Answer any four questions. Paper contains Five questions.

**3 HOURS**

**QUESTION ONE**

Define the following

- i. Internetwork
- ii. Frame
- iii. Packet
- iv. MAC Address
- v. Datagram [5]

b) Explain in full detail the following techniques;

- i) Source Routing
- ii) Bridge learning [10]

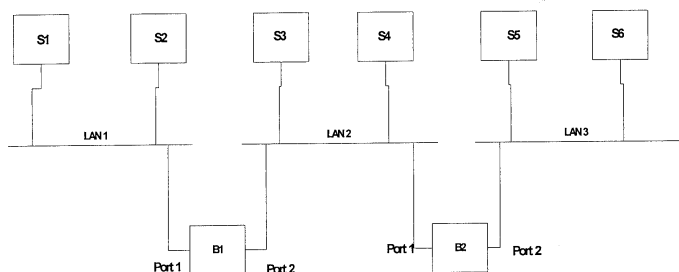
c] State why an additional procedure is required with wireless LANs (in addition to the basic MAC method) to ensure a transmission over a wireless medium is successful. Hence explain the principle of operation of the four-way handshake procedure used in the distributed foundation MAC protocol. [10]

**QUESTION TWO**

- a) The seven layers of the OSI reference model can be divided into two categories: upper layers and lower layers. With the aid of a diagram distinguish between these two types of categories. [5]
- b) By first defining each, distinguish between firewalls, adaptive router and proxy server. [10]
- c) What four techniques are employed for packet discarding in congestion control. Explain with clarity their methodologies including their advantages and disadvantages. [10]

**QUESTION THREE**

a)



Station	Port

Six stations (S1-S6) are connected to an extended LAN through transparent bridges (B1 and B2) as shown above. Initially, the forwarding tables of each bridge are empty. Suppose the following stations transmit frames: S2 transmits to S1, S5 and S4, S3 transmits to S5, S1 transmits to S2 and S6 transmits to S5 fill in the forwarding tables with appropriate entries after the frames have been completely transmitted. [15]

b) Explain in detail how the "Sliding-Window Flow Control" scheme works in congestion prevention. [5]

c) Explain the difference between connection-oriented acknowledged services and connectionless acknowledged services. How do the protocols that provide these services differ [5]

**QUESTION FOUR**

a) There are at least three methods of mapping network addresses to MAC addresses! Identify two and describe how they work. [5]

b) What system design techniques can be used to improve or better the performance of a network [15]

c) Given that two communicating DTE's A and B are separated by a optic fibre link and the bit rate of the channel is 100Mbits/sec, the propagation delay is 10sec. If the packets are an average of 150bits long calculate the ratio of the delay-bandwidth product to the average packet length and the efficiency of the channel. [5]

**QUESTION FIVE**

a) What network security issues should be considered when setting up a network? Discuss. [10]

a) Describe the functions of the following devices and where in a network can they be located

i) Router

- ii) Bridge
- iii) Switch
- iv) Hub
- v) Gateway

[10]

c) Compare and contrast issues relating to the TCP vs UDP protocols in the TCP/IP suite [5]

**END OF QUESTION PAPER**



**GOOD LUCK!**