UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2008/2009

April - May 2009

EEE 521 – COMPUTER AND DATA COMMUNICATIONS NETWORKS

Duration: 3 hours

Please check that this examination paper consists of EIGHT pages of printed material before you begin the examination.

This paper contains SIX questions.

Instructions: Answer **FIVE (5)** questions.

Answer to any question must start on a new page.

Distribution of marks for each question is given accordingly

All questions must be answered in English.

1. (a) Your organization has been assigned an IP network of 170.168.133.0/24. As a network engineer, you are to design your company's network utilizing CIDR classless notations with 6 departments having a separate subnetwork. Because your network equipments are out-of-date, you **cannot utilize the IP subnet 0.**

- Management subnet – 20 hosts
- Engineering subnet – 17 hosts
- Sales subnet – 23 hosts
- Maintenance subnet – 18 hosts
- Security subnet – 19 hosts
- Supervision subnet – 27 hosts

Base on this information:

(i) Determine the subnet addresses and subnet mask for each department

(ii) Identify the range of IP addresses and broadcast addresses being used by each department

(iii) Draw the suitable network connection using several routers

(13 marks)

(b) Discuss the computational model provided by:

(i) Distributed Shared Memory

(ii) Client Server

(iii) Remote Procedure Call

(12 marks)

2. (a) Reconfigure the following C class network in Figure 1(a) with 200 hosts into 4 supernetworks each having 50 hosts. Redraw the appropriate network diagram using several routers along with the connected hosts and their range of IP address assignments.

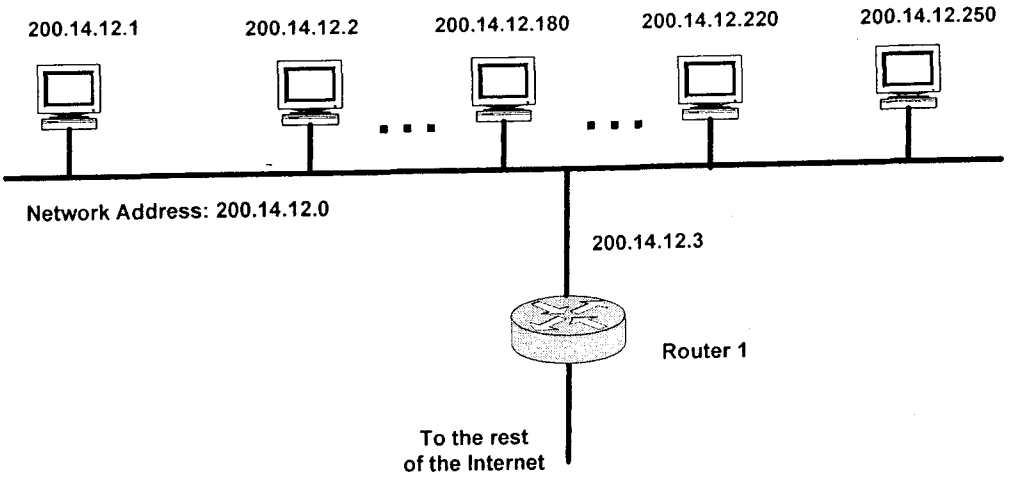

Figure 1(a): Network Diagram

(13 marks)

(b) Using an appropriate diagram, describe the TCP in terms of:

(i) Three way handshake sequence

(ii) Termination of connection requests

(12 marks)

3. (a) Discuss the main functionalities of the following communication devices. By using an appropriate example, identify the broadcast and collision domains for each device.

(i) Hub
(ii) Repeaters
(iii) Bridges

(9 marks)

(b) Consider the network diagram given in Figure 2.

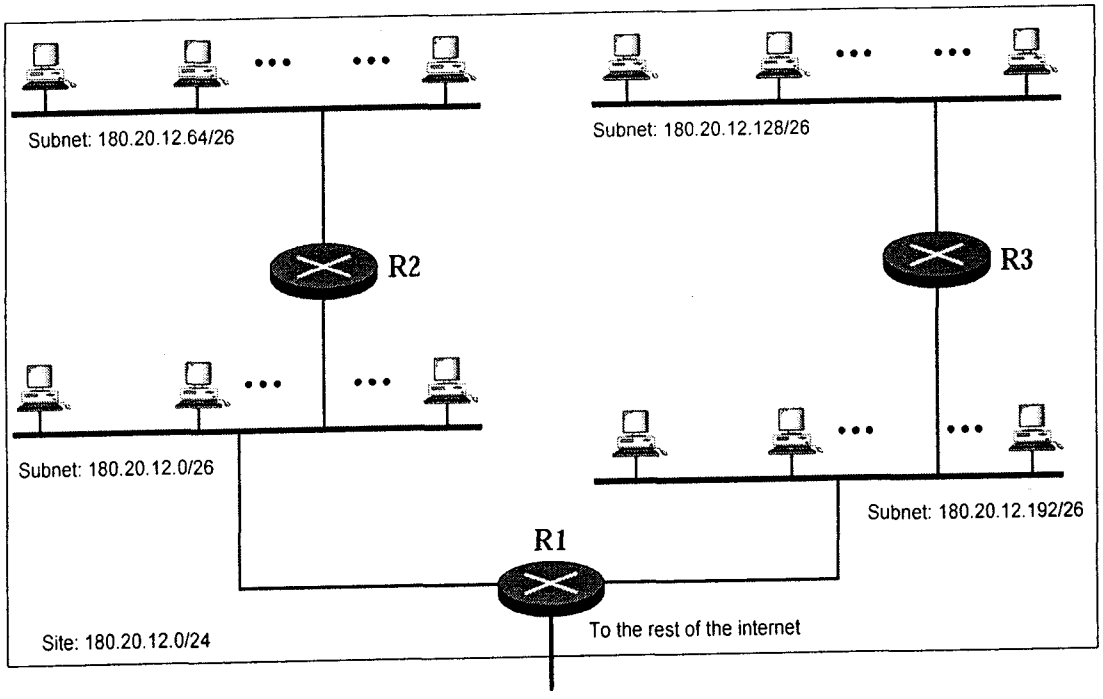

Figure 2

(i) Identify the range of possible IP and Broadcast addresses for all the subnets

(ii) The subnet 180.20.12.64/26 is to be subnetted into two more sub-networks. Using VLSM technique, identify the two sub-sub-networks addresses and the subnet mask along with the range of possible IP addresses.

(16 marks)

4. (a) Briefly, describe the function of the following TCP/IP tools

(i) Ping
(ii) Tracert
(iii) Netstat
(iv) IPconfig
(v) Nslookup

(10 marks)

(b) Given the following diagram of the spanning tree bridge network, determine which bridges would be used in forwarding packets?

(i)

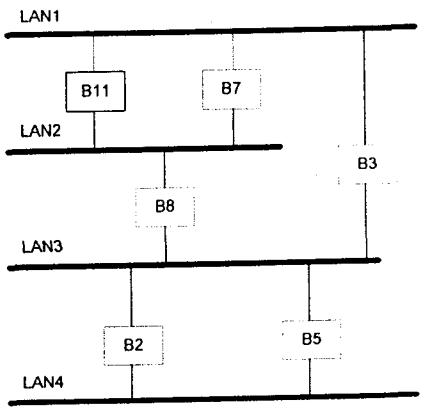

Figure 3(i): Bridge Network.

(ii)

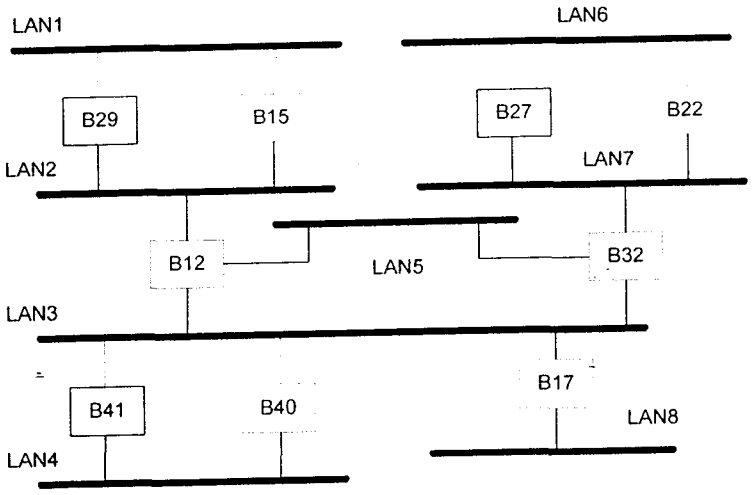

Figure 4 (ii): Bridge Network

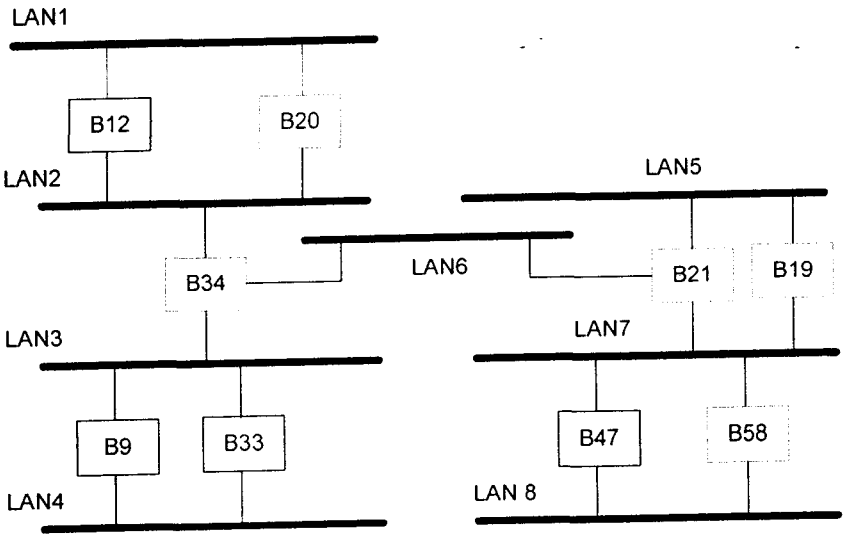

Figure 4 (iii): Bridge Network

(15 marks)

5. (a) Discuss the following:

(i) The main advantages of having hierarchical IP addresses

(ii) The differences between connection-oriented service and connectionless service

(iii) The working of ALOHA protocol to permit random access to the communication link

(iv) Using CSMA/CD to avoid collision

(12 marks)

(b) Discuss the loop problem caused by the redundant intelligent bridge, if computer A is to send a frame to computer D, as given in Figure 6.

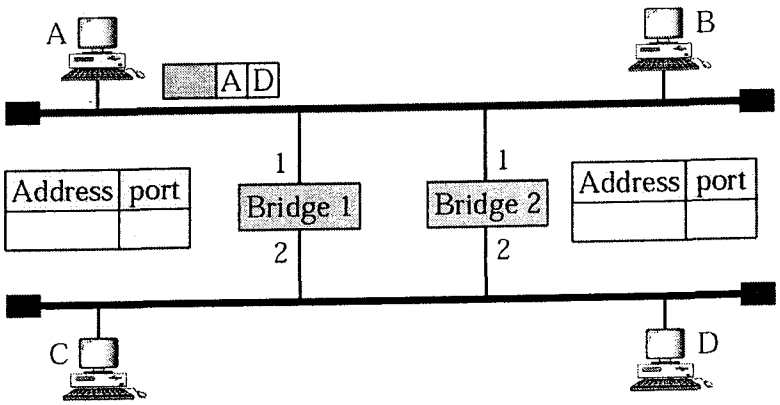

Figure 6

(5 marks)

(c) Discuss the following operations involving Linda based distributed shared memory.

(i) The in operation, *in (tuple)*
(ii) The in non-blocking operation, *in_nb (tuple)*
(iii) The out operation, *out (tuple)*
(iv) The read operation, *read (tuple)*

(8 marks)

6. (a) By using appropriate diagrams, describe the operation of Selective Repeat ARQ complete with its sliding window involving:

(i) Normal operation
(ii) The frame is lost
(iii) The acknowledgement is lost
(iv) The acknowledgement is delayed

(12 marks)

(b) Compare and contrast Selective Repeat ARQ with Stop and Wait ARQ and Go Back N ARQ.

(5 marks)

(c) Using suitable diagram where appropriate, describe the following protocols:

(i) TELNET protocol
(ii) FTP protocol

(8 marks)

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