MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

Department of Information and Communication Technology

IV SEMESTER B.TECH. (IT/CCE)

Grade Improvement / Makeup examination August 2021
SUBJECT: COMPUTER NETWORK PROTOCOLS [ICT 2255]
REVISED CREDIT SYSTEM
(04/08/2021)

Time: 2H   MAX. MARKS: 40

Instructions to Candidates:

- ❖ Answer any four full questions.
- ❖ Missing data may be suitably assumed.
- ❖ Time duration 150 Minutes [Write up 120 Minutes + 30 Minutes for Upload]

1A. Design a 32-input and 32-output multistage Banyan switching fabric. Write the binary sequence for the packet enters the input port at 2 and output port at 22 of banyan switch. **6**

1B. What are the services provided by the router at network layer? **4**

2A. An organization is granted a block of addresses with the beginning address 13.18.13.5/17. The organization needs 3 subblocks of addresses to assign as follows:

a.   First subblock has 18 customers; each needs approximately 56 addresses.

b.   Second subblock has 35 customers; each needs approximately 154 addresses.

c.   Third subblock has 138 customers; each needs approximately 88 addresses.

Assign the IP addresses and subnet mask efficiently for each subblock in the same order as shown above. Find the network id (IP address), broadcast id, range of host IP addresses assigned to the systems (from and to IP addresses), and total IP address is wasted in each subblock (first level of the hierarchy). **6**

2B. A router receives a packet with the destination address 141.14.142.37. Show the steps involved in the computation of network address and subnet address of the same packet. **4**

3A. What would be the routing table entries for router R1 for the network shown in the Figure Q3A?
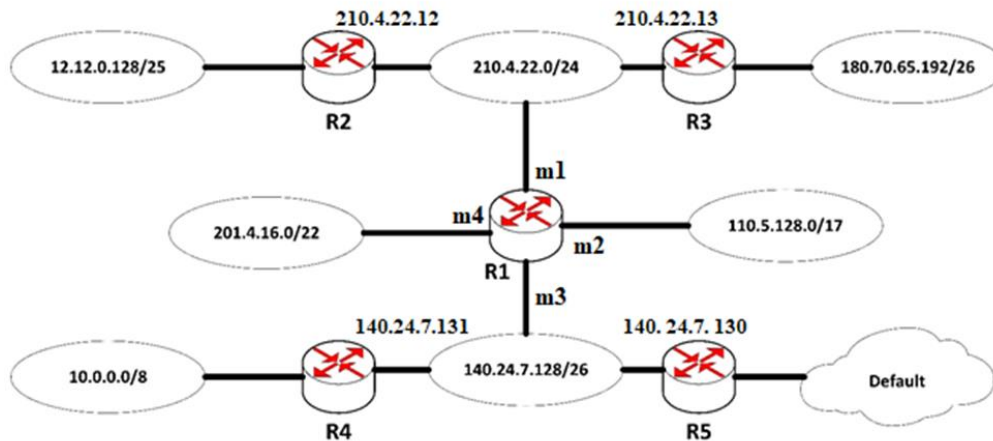

Figure Q3A

3B. How does Path Vector Routing algorithm realize in the BGP?

4A. A host with IP address 172.48.2.12 and Ethernet physical address 23:45:67:AB:12:CD has a packet to send another host with IP address 172.48.7.10 and Ethernet physical address A1:B2: A2:5E:77:CD (which is unknown to the first host). The 2 hosts are on the same Ethernet network. Show the entries in ARP request and reply packets encapsulated in Ethernet frames.

4B. The following is a DUMP of a UDP header in hexadecimal format.
06 32 00 0D 00 1C E2 17.

    i. What is source port number?
    ii. What is destination port number?
    iii. What is length of user datagram?
    iv. What is length of the data?
    v. Is the packet directed from a client to server or vice versa?

5A. Consider H1 generates a TCP segment that contains 5000 bytes in the network as shown in **Figure Q5A**. Assume an MTU of 1320 Bytes for path between R1 and R2, 2200 bytes between R1 and R3, 512 bytes between R2 and R4, and 480 bytes between R3 and R4. Additionally, consider that the packets belong to a communication from H1 to H2 are transmitted through R1, R2, and R4. Describe the M bit and the Offset field for IP fragments of the packets generated by the intermediate routers. Also, calculate the total number of IP packets received by the H2.
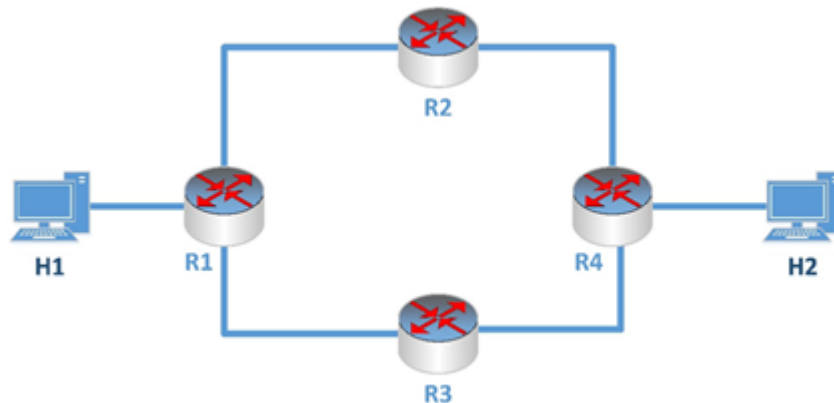
6

4

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5

6

Figure Q5A

5B. Distinguish between direct verses indirect delivery of IP packets. **4**

6A. TCP opens a connection using an initial sequence number (ISN) of 14,534. The other party opens the connection with an ISN of 21,732.

    i.   Show the three TCP segments during the connection establishment.

    ii.   Show the contents of the segments during the data transmission if the initiator sends a segment containing the message "Hello customer" and the other party answers with a segment containing "Hi seller".

Assume: size of each alphabet is 1 byte, size of whitespace is 1 byte, and window size is 500 bytes. **5**

6B. Alice has a file of size 1.5MB to send to Bob. The TCP connection uses a maximum segment size (MSS) of 1.5KB. The round trip time (RTT) is 20ms. Assume that the TCP always uses slow start to increase the window size. There is no congestion, no packet loss and the initial congestion window size (CWND) is 1 MSS. How much time will be required to transfer the entire file? Show the detailed process. **5**