VIT
Vellore Institute of Technology

Final Assessment Test - November/December 2023

Course: PMCA505L - Data Communication and Networking

Time: Three Hours

Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. During the network communication, how various layers of OSI model exchange information to establish a connection between two end systems? Describe the responsibilities of each layer with the help of a suitable diagram.

2. a) Four channels are multiplexed using TDM. If each channel sends 1000 bytes/s and we multiplex 1 byte per channel, show the frame traveling on the link, the size of the frame, the duration of a frame, the frame rate, and the bit rate for the link. [5]

   b) The loss in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with -0.3 dBlkm has a power of 2 mW, what is the power of the signal at 5 km? [5]

3. a) Dhoni wants to talk with Kohli over telephone. When he places a call, the switching equipment within the telephone system seeks out a physical path all the way from Dhoni's telephone to the Kohli's telephone. Brief about the switching technique used in the above scenario and highlight the disadvantages of the same comparing with the other switching techniques. [5]

   b) How does the ARP protocol function on Mapping IP Address to MAC Addresses in a local Network? Explain it with a suitable diagram. [5]

4. a) A bit stream 10011101 is transmitted using the CRC method described in the text. The generator polynomial is X^3 + 1. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission show that this error is detected at the receiver's end. [6]

   b) A sender needs to send the four data items 3456, ABCC, 02BC and EEEE (Data are in Hex). [4]

   Answer the following:

   i) Find the checksum at the sender site.

   ii) Find the checksum at the receiver site if there is no error.

   iii) Find the checksum at the receiver site if the second data item is changed to ABCE.

   iv) Find the checksum at the receiver site if the second data item is changed to ABCE and the third data item is changed to 02BA.

5. An ISP is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 100 organizations with each organization receiving just eight addresses. Design the sub blocks and give the slash notation for each sub block. Find out how many addresses are still available after these allocations.

6. a) The following is a dump of a TCP header in hexadecimal format. [6]

05320017 00000001 00000000 500207FF 00000000

i) What is the source port number?

ii) What is the destination port number?

iii) What is the sequence number?

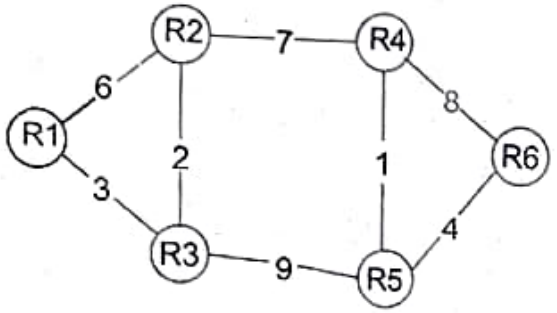
iv) What is the acknowledgment number?

v) What is the length of the header?

b) Illustrate the congestion control mechanism using closed loop method. [4]

7. Identify the protocol that is used to communicate management information between the Network Management System and the Network Elements? Explain the identified protocol and its operations in detail.

8. Consider a network with 6 routers R1 to R6 connected with links having weights as shown in the following diagram.



Use the distance vector routing algorithm to update the routing tables for each router. Each router starts with its routing table initialized to contain an entry for each neighbour with the weight of the respective connecting link. After all the routing tables stabilize, how many links in the network will never be used for carrying any data?

9. Recognize the technique used for a network to provide better service to selected network traffic over various underlying technologies. Explain in detail.

10. a) Compare and contrast the Go-Back-N ARQ protocol with selective repeat ARQ. [5]

b) Classify the Behaviour of three persistence protocols that can be used with CSMA. [5]

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