BE (ELECTRONICS & TELECOMMUNICATION ENGG.) Exam., 2018

(FOURTH YEAR --FIRS SEMESTER)

COMPUTER COMMUNICATION NETWORKS

FULL MARKS -100

ANSWER ANY FIVE QUESTIONS   ALL QUESTION CARRY EQUAL MARKS

MARKS (10 + 5 + 5)

1. a) Describe with a frame format the principle of SONET. What are virtual tributaries? How they are multiplexed onto a SONET STS-1 frame format? Why and how byte interleaving is to be done in SONET?

b) What is the minimum size of an Ethernet frame that carries an IP packet which in turn carries an ICMP packet? What is the maximum size?

c) Is the size of the ARP packet fixed? Explain. What is the size of an Ethernet frame carrying an ARP packet?

10 + 10

2. a) What is Spanning Tree algorithm ? Show with diagrams how a spanning tree is created. Explain how it can be utilized to remove loops in a communication network.

   b.) Create a system of 3 LANs with 4 bridges. The bridges (B1 to B4) connect the LANs as follows:

(i) B1 connects LAN1 and LAN2

(ii) B2 connects LAN1 and LAN3

(iii) B3 connects LAN2 and LAN3

(iv) B4 connects LAN1, LAN2 and LAN3

Choose B1 as the root bridge. Show the forwarding and blocking ports after applying the spanning tree procedure.

10 + 10

3. a) Why an end to end flow control technique is required at transport layer and how is it implemented? What is the header format of TCP?

b) With the help of Finite State Machine model describe the TCP connection management.

(8 + 6 + 6)

4. a)Why do LANs tend to use broadcast networks? Why not use networks consisting of multiplexers and switches? Explain.

b) In a LAN, which MAC protocol has a higher efficiency: ALOHA or CSMA-CD? What about in a WAN? Explain

c) Consider four stations that are attached to two different bus cables. The stations exchange fixed-size frames of length 1 sec. Time are divided into slots of 1 sec. When a station has a frame to transmit, the station chooses either bus with equal probability and transmits at the beginning of the next slot with probability p. Find the value of p that maximizes the rate at which frames are successfully transmitted.

(10+6+4)

5 a) What is the purpose of the protocol field in the PPP frame? Discuss the control field in the PPP frame and describe each of the states of a PPP connection.

b) The value of the first few bytes of a frame is $7EFFC0C02109110014_{16}$. What is the protocol of the encapsulated payload? What type of packet is being carried? How many bytes of information are in the packet?

c) A system sends the challenge value $2A2B1425_{16}$. The password of the user is 22112211_{16}. The function to be used by the user adds the challenge value to the password; the result should be split into two and swapped to get the response. Show the response of the user.

(5 + 5 + 5 + 5)

6. a) Name the five current IP address classes. Which are used for unicast communication? Explain the purpose of subnetting. Given an example of supernetting. Why the Internet does use a connectionless network service?

b) A router outside an organization receives a packet with destination address 190.240.7.91. Show how it finds the network address to route the packet. Now, a router inside the organization receives the same packet with destination address 190.240.33.91. Show how it finds the subnetwork address to route the packet.

c) A University has 150 LANs with 100 hosts in each LAN. Suppose the university has one class-B address. Design an appropriate subnet addressing scheme.

(d) A small organization has a Class C address for seven (7) networks each with 24 hosts. What is an appropriate subnet mask?

7. Consider the network in Fig.1.   (8 +5 + 7)

a) Use the Bellman-Ford algorithm to find the set of shortest paths from all nodes to the destination node 2.

b) Now continue the algorithm after the link between node 2 and node 4 goes down.

c) Use the Dijkstra's algorithm to find the set of shortest paths from node 4 to other nodes. Find the set of associated routing table entries.
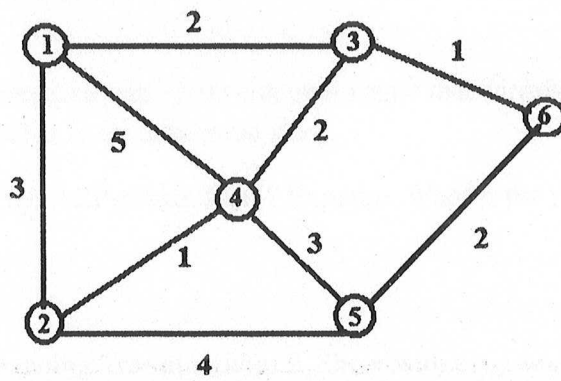

Fig.1 A network with associated link costs

(10 + 10)

8. Write short notes on any TWO of the following:

 a) Border Gateway Protocol

 b) CSMA/CA used in WLAN

 c) Gigabit Ethernet

 d) Stop-and Wait ARQ-- Its Flow and Error Control Mechanisms

 e) CRC coding scheme