Pandit Deendayal Petroleum University, Gandhinagar
School of Technology
End Semester Examination

B. Tech. (Computer and ICT Engineering)   **Semester - IV**
Date: 24 May 2019   **Time: 10:00 AM to 1:00 PM**
Course Name : Computer Networks   **Course Code : 17CP213T**
      Max. Marks: 100

Instructions to students:
1. Figures to the right indicate full marks.
2. Do not write anything other than your roll number on the question paper.
3. Assume suitable data wherever required and mention it clearly.
4. You are required to answer all the questions in the sequence as given in the question paper. **The out of sequence attempts may not be assessed.**
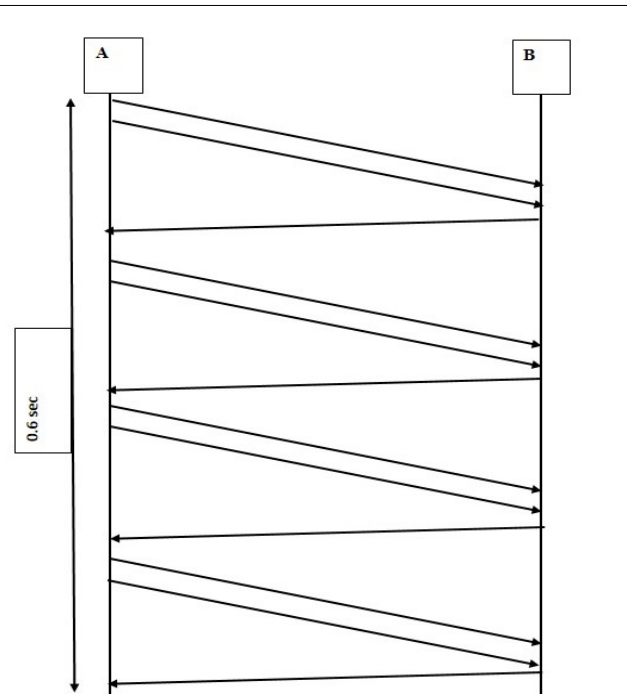
Marks

Q-1 Answer the Following Questions: **[20]**

a) Find the efficiency of the ring where data rate of the ring is 4 mbps, no. of stations are 20, separated by 100 meter and bit delay in each station is 25 bits. Recalculate the problem for 16 mbps data rate of the link with 80 stations. Assume early token reinsertion with packet size of 1000 bits. **[10]**

b) Consider the diagram showing an exchange of Ethernet frames between two computers A and B via 10BaseT hub (shared channel). Each frame sent by computer A contains 1500 bytes of Ethernet payload data, while each frame sent by computer B contains 40 bytes of Ethernet payload data. Calculate the average utilization of the medium in the exchange. **[10]**
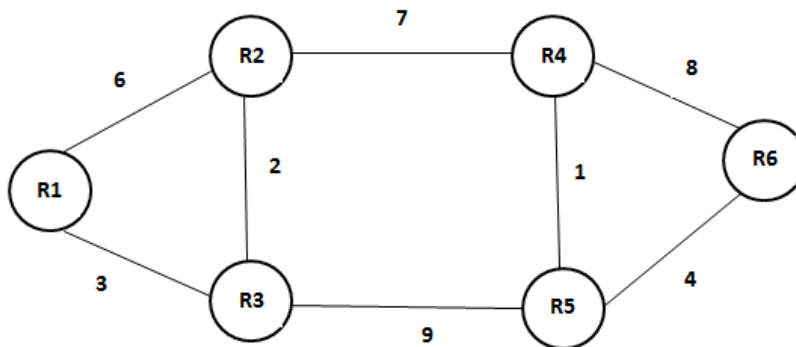

Q-2 Answer the Following Questions: **[20]**

a) Consider three IP networks A, B and C. Host H_A in networks A sends message each containing 180 Bytes of application data to a host H_C in network C. The TCP layer prefixes 20 Bytes header to the message. This passes through on intermediate network B. The maximum packet size, including 20B IP headers in each network is A: 500 Bytes, B: 100 Bytes, and C: 1000 Bytes. The network A and B are connected through 512 Kbps link, while B and C are connected by a 256 Kbps link. **[15]**

i. Assuming that the packets are correctly delivered, how many Bytes including headers, are delivered to IP layer at destination for one application message in the best case? Consider only data packets.
ii. What is the rate at which application data is transferred to host H_C? Ignore errors, acknowledgements and other overheads?
iii. What is the amount of extra overhead caused by fragmentation?

b) In TDM medium access control bus LAN, each station is assigned one time slot per cycle for transmission. Assume that the length of each time slot is time to transmit 100 bits plus end-to-end propagation delay. Let propagation speed is $2 * 10^8$ m/sec. Length of LAN is 1Km with a bandwidth of 10 Mbps. Maximum number of stations that can be allowed in a LAN, so that the throughput of each station can be 2/3 Mbps. **[5]**

Q-3 Consider the network with 6 Routers R1 to R6 with links and weights as shown below: **[20]**

i. After routing tables stabilize using distance vector routing (DVR). How many links in the network will never be used for carrying any data?
ii. Suppose, weight of all unused links in the previous question are changed to 2 and using DVR, all routing tables stabilizes. How many links will now remain unused?

Q-4 Answer the Following Questions: **[20]**

a) A TCP machine is sending windows 65,535 bytes over a 1-Gbps channel that has a 10 msec one way delay. What is the maximum throughput achievable? What is the line efficiency? **[10]**

b) Explain with example the role of each layer in TCP/IP protocol stack. **[10]**

Q-5 Answer the Following Questions: **[20]**

a) Explain the slow start and fast retransmit mechanism of TCP congestion control. Calculate the effective throughput for transferring a 1000KB file assuming TCP using slow start congestion control technique. Given the round trip time 100 ms, and maximum segment size is 1460bytes. Assume there are no losses and both the bandwidth and the receiver window size is infinite. **[10]**

b) Explain one of the following technologies: Software Defined Networks, IPV6, and Internet of things. **[5]**

c) Explain any one of the following protocols: Dynamic Host Configuration Protocol, Address Resolution Protocol, File transfer protocol **[5]**