Roll No.:.....

National Institute of Technology Delhi

End Sem Examination: B.Tech. (Nov. 2019)

Branch: CSE (B.Tech.)

Title of the Course: Computer Networks

Time:3 Hours

Note: 1. All parts of section A are compulsory.

2. Attempt any four questions in section B.

3. Attempt any two questions in section C.

textbf4. Attempt all questions.

5. Read all questions carefully.

3. Missing parameters or values may be assumed.

Semester: V

Course Code: CSB 304

Maximum Marks: 50

PART-A

1. (a) In the IPv4 addressing format, the number of networks allowed under Class C addresses is, (1)
   (i) 2^{14} (ii) 2^{7} (iii) 2^{21} (iv) 2^{24}

   (b) Which of the following is not true about Subnetting? (1)
   - i. It can be applied only for single network.
   - ii. It is used to improve security.
   - iii. Here, bits are borrowed from network ID portion.
   - iv. Here, bits are borrowed from host ID portion.

   (c) Which device uses logical addressing system? (1)
   (i)Hub (ii) Switch (iii) bridge (iv) Router

   (d) In which of the following protocol(s) it is possible for sender to receive acknowledgement for a packet that falls outside its current window? (1)
   - i. Selective repeat protocol
   - ii. Stop and wait protocol
   - iii. Go back N protocol
   - iv. All of the above

   (e) In a token ring network the transmission speed is 10^7 bps and the propagation speed is 200 metres/micro second. The 1-bit delay in this network is equivalent to: (2)
   - i. 500 metres of cable.
   - ii. 200 metres of cable.

iii. 20 metres of cable.

iv. 50 metres of cable.

(f) How many bits are allocated for Network ID and Host ID in 23.192.157.234 (2)

(g) Suppose that instead of using 16-bits for network part of class B address, 20-bits have been used. How many class B networks would have been possible? (2)

PART-B

2. (a) Consider a network with 6 routers $R1$ to $R6$ connected with links having weights as shown in the Fig. 1 (3)

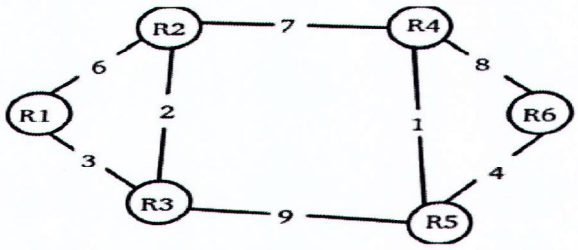

Figure 1:

All the routers use the distance vector based routing algorithm to update their routing tables. 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?

(b) A host with IP address 200.100.1.1 wants to send a packet to all hosts in the same network. What are the source IP and Destination IP addresses. (2)

3. (a) What is vulnerable period? How it affects the performance in MAC protocols? (2)

(b) What are the drawbacks in Distance Vector routing and how these drawbacks are resolved in Link State routing? (3)

4. Find the throughput, S expression in terms of of G (new and old frames generated by stations are modeled by a Poisson distribution with a mean of G frames per frame time) in Pure and slotted ALOHA. Calculate maximum throughput in both cases. Compare both by plotting a figure, S vs G. Also (5)

5. (a) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted. Suppose that the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end. Give an example of bit errors in the bit string transmitted that will not be detected by the receiver. (3)

(b) Suppose that a message 1001 1100 1010 0011 is transmitted using Internet Checksum (4-bit word). What is the value of the checksum? (2)

6. Write shorts notes on *any two* of the following: (5)

   (a) ARP

   (b) DHCP

   (c) ICMP

PART C

7. Differentiate among UDP and TCP transport layer protocols. Show TCP segment header with a neat diagram with all its fields. How connections are established and released in TCP? (10)

8. (a) In GB4, if every 6th packet that is being transmitted is lost and if we have to send 10 packets then how many transmissions are required. (4)

   (b) Prove that utilization of sliding window protocol for error free channel is $U = W/(1 + 2a)$, where W is window size and a is ratio of propagation time to transmission time. (3)

   (c) In sliding window GB N, packet transmission time is 10 ms, propagation time 49.5 ms and bandwith is 40 Mbps then calculate the maximum sender window size and efficiency of GB N. (3)

9. (a) Discuss the CSMA/CD Protocol and also differentiate the CSMA/CD with other CSMA protocols. (4)

   (b) In a CSMA/CD network running at 1Gbps over 1-km cable with no repeaters. The signal speed in the cable is 200000 Km/sec. What is the minimum frame size? (3)

   (c) A channel has a data rate of 4 kbps and a one way propagation delay of 20 ms. For what range of frame sizes does stop-and-wait give an efficiency of at least 50%? (3)