

Nirma University

Institute of Technology

Semester End Examination (RPR), May - 2017

B. Tech. in Computer Engineering, Semester-V

2IT321 Computer Networks

Roll /

Exam No.

Supervisor's initial
with date

Time: 3 Hours

Max. Marks: 100

Instructions:

1. Attempt all questions.
2. Figures to right indicate full marks.
3. Use section-wise separate answer book.
4. Draw neat sketches wherever necessary.

SECTION - I

Q-1.

[20]

- (A) The following character encoding is used in a data link protocol: (10)
A: 01000111; B: 11100011; FLAG: 01111110; ESC: 11100000
Show the bit sequence transmitted (in binary) for the four-character frame: A B ESC FLAG when each of the well-known framing methods is used.
- (B) Draw the IEEE 802.3 (Ethernet) frame format. Explain usage of each field. Explain the reason behind IEEE 802.3 posing a constraint on minimum frame size. What is the reason behind having specifically 64 bytes as minimum frame size for IEEE 802.3 networks? (10)

Q-2.

[20]

- (A) Elaborate on Carrier Sense Multiple Access and its versions. Use neat diagrams to support your explanation. (12)

OR

- (A) Draw the Finite State Machines (FSM) describing the following data link layer protocols: (12)
i) Simplex protocol for noisy channel
ii) Full duplex protocol for noisy channel
- (B) Explain the need of pipe-lining at data link layer. Derive the equation representing line utilization in case pipe-lining is used. (08)

- Q-3.** The message 11001001 is to be transmitted using the CRC polynomial $3x + 1$ to protect it from errors. What message will be transmitted after applying CRC? Why do data link layer protocols almost always put CRC in the trailer and not in the header? **[10]**

SECTION - II

Q-4.

[20]

- (A) Consider a source computer (S) transmitting a file of size 10^6 bits to destination computer (D) over a network of two routers (R1 and R2) and three links (L1, L2 and L3). L1 connects S to R1, L2 connects R1 to R2 and L3 connects R2 to D. Let each link be of length 100 km. Assume signals travel over each line with a speed of 10^8 m/s. Assume that the link bandwidth on each link is 1 Mbps. Let the file be broken down into 1000 packets each of size 1000 bits. Find the total sum of transmission and propagation delays in transmitting the files from S to D. (10)
- (B) What is the major difference between UDP and TCP protocols? Explain the scenarios when (10)
- UDP will be preferred over TCP
 - TCP is preferred over UDP
 - There is no difference in performance whether TCP or UDP is used.

Q-5.

[20]

- (A) Consider the network of Fig. 1. (12)
- Find the shortest path between A to D using Dijkstra algorithm.
 - Ignore the weights on the lines in Fig. 1. Suppose that it uses flooding as the routing algorithm. If a packet sent by A to D has a maximum hop count of 3, list all the routes it will take. Also tell how many hops worth of bandwidth it consumes.

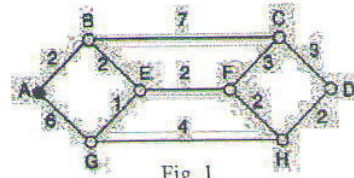


Fig. 1

OR

- (A) Demonstrate the working of Distance Vector Routing (DVR) and construct the final routing table for Node A using DVR. Explain count-to-infinity problem in DVR. Also suggest a solution to it. (12)

Information stored at node	Distance to reach node						
	A	B	C	D	E	F	G
A	0	1	1	∞	1	1	∞
B	1	0	1	∞	∞	∞	∞
C	1	1	0	1	∞	∞	∞
D	∞	∞	1	0	∞	∞	1
E	1	∞	∞	∞	0	∞	∞
F	1	∞	∞	∞	∞	0	1
G	∞	∞	∞	1	∞	1	0

- (B) Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are even numbers suddenly become ready at once, how many bit slots are needed to resolve the contention? (08)
- Q-6. Frames of 1000 bits are sent over a 106 bps duplex link between two hosts. The propagation time is 25 ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link). [10]
- What is the minimum number of bits (i) required to represent the sequence numbers distinctly? Assume that no time gap needs to be given between transmissions of two frames.
 - Suppose that the sliding window protocol is used with the sender window size of 2^i , where i is the number of bits identified in the earlier part and acknowledgements are always piggy backed. After sending 2^i frames, what is the minimum time the sender will have to wait before starting transmission of the next frame? (Identify the closest choice ignoring the frame processing time.)