Nirma University

Institute of Technology

Semester End Examination (IR/RPR), December - 2019

B. Tech. in Computer Engineering, Semester-V

CE503 Computer Networks

Roll/ Exam No.		Supervisor's initial with date	

Time: 3 Hours | Max. Marks: 100

Instructions:

1. Attempt all questions.
2. Figures to the right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Assume suitable data wherever necessary and specify them.
5. **Sub-questions of each of the six questions must be written together.**

SECTION – I

Q.1 Do as directed. **[18]**

A) CO3BL5 One of your classmates has pointed out that it is wasteful to end each frame with a flag byte and then begin the next one with a second flag byte. One flag byte could do the job as well, and a byte saved is a byte earned. Do you agree? **(3)**

B) CO1BL2 What is the principal difference between connectionless communication and connection-oriented communication? **(3)**

C) CO3BL4 Explain the basic bit map protocol with example. Also analyze the best case, worst case and average case channel efficiency when the said protocol is used. **(6)**

D) CO3BL5 Compare the delay in sending an x-bit message over a k-hop path in a circuit-switched network and in a (lightly loaded) packet-switched network. The circuit setup time is s sec, the propagation delay is d sec per hop, the packet size is p bits, and the data rate is b bps. Under what conditions does the packet-switched network have a lower delay as compared to circuit-switched network? Also, explain the conditions under which a packet-switched network is preferable to a circuit switched network. **(6)**

OR

D) CO3BL5 Explain the basic working of ARQ protocols. In the discussion of ARQ protocol, a scenario was outlined that resulted in the receiver accepting two copies of the same frame due to a loss of acknowledgement frame. Is it possible that a receiver may accept multiple copies of the same frame when none of the frames (message or acknowledgement) are lost? **(6)**

Q-2 Do as directed. **[16]**

A) A 3000-km-long T1 trunk is used to transmit 64-byte frames using **(6)**

CO4BL4 go back N. If the propagation speed is 6 μsec/km, how many bits should the sequence numbers be? [T1 line has transmission speed 1.536 Mbps]

B) CO3BL5 Assume CSMA/CD protocol. Find the minimum frame length for a 1Mbps bit rate and maximum network span of 10 km with no repeaters. Assume a medium propagation delay of 4.5 nanoseconds per meter. What will be the minimum frame size required? Is CSMA/CD a reasonable protocol for a network of this span and bit rate? **(5)**

C) CO1BL2 What does "negotiation" mean when discussing network protocols? Give an example. **(5)**

Q.3 Do as directed. **[16]**

A) CO2BL3 In some networks, the data link layer handles transmission errors by requesting damaged frames to be retransmitted. If the probability of a frame's being damaged is P, what is the mean number of transmissions required to send a frame? Assume that the acknowledgements are never lost. **(6)**

B) CO3BL3 A large population of ALOHA users manages to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec. **(6)**

(a) What is the chance of success on the first attempt?

(b) What is the probability of exactly k collisions and then a success?

OR

B) CO3BL3 Suppose that an 11-Mbps 802.11b LAN is transmitting 64-byte frames back-to-back over a radio channel with a bit error rate of 10^{-7}. How many frames per second will be damaged on an average? **(6)**

C) CO2BL2 What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols? **(4)**

SECTION - II

Q.4 Do as directed. **[18]**

A) CO3BL5 Discuss the rationale behind optimality principal for routing in computer networks. Explain algorithm used in link state routing for finding shortest path with suitable example. **(8)**

B) CO4BL3 Suppose that host A is connected to a router R1, R1 is connected to another router, R2, and R2 is connected to host B. Suppose that a TCP message that contains 900 bytes of data and 20 bytes of TCP header is passed to the IP code at host A for delivery to B. Show the Total length, Identification, DF, MF, and Fragment offset fields of the IP header in each packet transmitted over the three links. Assume that link A-R1 can support a maximum frame size of 1024 bytes including a 14-byte frame header, link R1-R2 can support a maximum frame size of 512 bytes, including an 8-byte frame header, and link R2-B can support a maximum frame size of 512 bytes including a 12-byte frame header. **(6)**

C) CO3BL4	Differentiate between distance vector routing and link state routing.	**(4)**	
Q.5	**Do as directed.**	**[16]**	
A) CO3BL2	Discuss ways in which congestion control can be done in datagram subnets by network layer.	**(6)**	
B) CO4BL3	A computer can produce data at the rate of 200 Mbps and the network runs at 80 Mbps. Suppose data comes in 1MB bursts, one 40-millisec burst every second. The average outgoing data rate required is 2 MB/sec. The capacity of token bucket and leaky bucket is 500 KB. Output of token bucket is fed into leaky bucket. Calculate time taken to transmit one burst.	**(6)**	
	OR		
B) CO4BL6	A company is assigned the network address 172.11.128.0/18. The network is to be divided into four subnets having 2048, 8192 and 4096 host computers respectively. Calculate network address, subnet mask and range of IP addresses for each subnet. How many IP addresses will remain unallocated?	**(6)**	
C) CO4BL5	The set of IP addresses from 29.18.0.0 to 29.18.128.255 has been aggregated to 29.18.0.0/17. However, there is a gap of 1024 unassigned addresses from 29.18.60.0 to 29.18.63.255 that are now suddenly assigned to a host using a different outgoing line. Is it now necessary to split up the aggregate address into its constituent blocks, add the new block to the table, and then see if any re-aggregation is possible? If not, what can be done instead?	**(4)**	
Q.6	**Do as directed.**	**[16]**	
A) CO3BL5	Why three way handshake mechanism is used for transport layer full duplex connection release? Justify using suitable example(s).	**(10)**	
B) CO3BL4	Differentiate between iterative and recursive query mechanism of DNS with suitable examples.	**(6)**	
	OR		
B) CO3BL4	What is the major difference between UDP and TCP protocols? Explain the scenarios when (i) UDP will be preferred over TCP (ii) TCP is preferred over UDP	**(6)**	