DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER VI [COMPUTER ENGINEERING]
SUBJECT: (CE611) NAME: COMPUTER NETWORKS

Examination : Regular
Date : 22/04/2026
Time : 10.00 to 1.00 pm
Seat No : 103
Day : Tuesday
Max. Marks : 60

INSTRUCTIONS:

1. Answer each section in separate answer book.
2. Figures to the right indicate maximum marks for that question.
3. The symbols used carry their usual meanings.
4. Assume suitable data, if required & mention them clearly.
5. Draw neat sketches wherever necessary.

SECTION – I

Q.1 **Do as directed.** **[10]**

CO4 A (a) What is the subnet mask for a Class C IP address using 3 bits for subnetting? Show your calculation. [2]

CO4 E (b) The address 43:7B:6C:ED:10:00 has been shown as the source address in an Ethernet frame. The receiver has discarded the frame. Why? [2]

CO2 R (c) A management station, called a_____(manager / agent), is a host that runs the_____ (SNMP Server program / SNMP client program) and a managed station, called an _____ (manager / agent), is a router or a host that runs the_____(SNMP Server program / SNMP client program). [2]

CO3 U (d) Describe the loop problem created by redundant bridges in the system with suitable diagram. [2]

CO3 N (e) For each of the following, identify whether it occurs as part of distance vector routing or link state routing. [2]

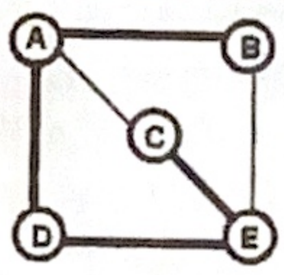
1. Only neighbors exchange information about their routes.
2. Non-neighbors exchange information about their routes.
3. The count to infinity problem might be encountered.
4. The algorithm determines the complete topology of the network.

Q.2 Attempt ***Any TWO*** from the following questions. **[10]**

CO3 C (a) You are given a block of IP addresses: 192.168.100.0/24. Design an IP addressing scheme using subnetting for an organization with 4 departments having 60, 30, 25, and 12 devices respectively. [5]

CO3 E (b) You are given the following IPv4 fragment headers received at the destination: [5]
Fragment 1: ID = 3004, Offset = 0, MF = 1, Total Length = 580
Fragment 2: ID = 3004, Offset = 140, MF = 0, Total Length = 180
Fragment 3: ID = 3004, Offset = 70, MF = 1, Total Length = 580
Consider that all numbers are presented in decimal. Do all these fragments belong to the same original IP packet? Justify your answer. Calculate the data size of each fragment. What is the total size of the original IP payload (excluding headers)? Show your calculation. Identify the first fragment and the last fragment. Justify your answers

CO3 A (c) For the subnet shown in figure below, dark links show a sink tree for **router A**. How many packets are generated by a broadcast from A using Spanning tree-based broadcast technique? Build a tree generated by Reverse Path Forwarding. How many packets are generated by a broadcast from A using Reverse Path Forwarding broadcast technique? [5]



Q.3 **Attempt the following questions.** **[10]**

CO1 U (a) Briefly describe co-axial cable as medium of communication. Draw a cutaway view of coaxial cable. [3]

CO1 A (b) 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. [4]
1. What are the chances of success on the first attempt?
2. What is the probability of exactly k collisions and then a success, where k=5?

CO1 N (c) Assume that there are only two stations, A and B, in a CSMA/CD network. The distance between the two stations is 2000m and the propagation speed is 2 x 10^8m/s. If station A starts transmission at time t1: [3]
(1) Does the protocol allow station B to start transmitting at time t1+8 μs? If the answer is yes, what will happen? If the answer is no, why not? (2) Does the protocol allow station B to

start transmitting at time t1+11 μs? If the answer is yes, what will happen? If the answer is no, why not?

OR

Q.3 Attempt the following questions. **[10]**

CO1 U (a) Briefly describe the layers of ATM. [3]

CO1 A (b) The following packets arrive at the output port of a switch using a leaky bucket algorithm. The bucket can contain up to 3000 bytes. [4]

Packet No	1	2	3	4	5	6	7	8	9
Arrival Time(msec)	1	2	3	4	5	6	7	8	9
Size (Byte)	100	400	400	1000	1000	1000	1000	1100	1000

The leaky bucket operates on packets, and can send 1 packet every 3 milliseconds. First packet is transmitted as soon as it arrives, i.e. at time 1 msec. Assuming no packet arrives past time 10, show when packets leave and which packets are dropped (if any). Also show what packet(s) are left in the buffer, if any, at time 10.

CO1 N (c) Which of the following can be the beginning address of a block that contains 256 addresses? Show your calculation. [3]

1) 205.16.37.32 2) 190.16.42.0 3) 17.17.32.52

SECTION – II

Q.4 Do as directed. **[10]**

CO4 U (a) How does IGMP work in conjunction with a router? [2]

CO1 N (b) Which Ethernet address is used for the destination in an RARP request? Which Ethernet address is used for the destination in an ARP request? [2]

CO1 U (c) What is the role of auxiliary timer and what action should be taken on timer expiration? [2]

CO2 R (d) Which transport layer protocol(s) and network layer protocol(s) are used for video, file transfer, DNS and email? [2]

CO3 A (e) If the TCP round-trip time, RTT, is currently 20 msec and the following acknowledgements come in after 22, 20, and 24 msec, respectively, what is the new RTT estimate using the Jacobson algorithm? Use $\alpha = 0.8$ [2]

Q.5 Attempt *Any TWO* from the following questions. **[10]**

CO4 N (a) When will "time exceeded" message be generated in ICMP? Who may generate this message? Explain implementation of *tracert* in brief. [5]

CO4 A (b) (i) A bit stream 110110011 is transmitted using the standard CRC method described in the text. The generator polynomial is $x3 + 1$. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show how this error is detected at the receiver's end. [5]

(ii) What are UA and MTA? What do they do?

CO4 E (c) Discuss similarities and differences between data link layer and transport layer. If acknowledgement is to be provided only at one layer, at which layer should it be included? Why? [5]

Q.6 Attempt the following questions. **[10]**

CO2 A (a) A sender uses the Stop-and-Wait protocol for reliable transmission of frames. Frames are of size 1000 bytes and the transmission rate at the sender is 80 Kbps (1Kbps = 1000 bits/second). Size of an acknowledgement is 100 bytes and the transmission rate at the receiver is 8 Kbps. The propagation delay is 100 milliseconds. Assuming no frame is lost, find out sender's throughput (in bytes/second). [5]

CO2 N (b) All segments are of uniform size 3000 bytes. Transmitter always has permitted data to send. Receiver's advertised window is 64K. Slow Start Threshold = 64K. [5]

(a) What will be acknowledgement number in response to a segment which has sequence number 10? (b) If cwnd is 8, how many cycles will sender consume before entering in to linear rise? (c) Timeout occurs when cwnd is 30, what will be new value of cwnd and ssthresh? (d) If cwnd is 64, what will be sender's window?

OR

Q.6 Attempt the following questions. **[10]**

CO2 A (a) Consider a selective repeat sliding window protocol that uses a frame size of 1 KB to send data on a 1.2 Mbps link with a one-way latency of 50 msec. To achieve a link utilization of 70%, What is the minimum number of bits required to represent the sequence number field? [5]

CO2 N (b) Running TCP across wireless networks may lead to performance problems. Why? Suggest at least one solution for the problem. Also discuss limitations of the solution if there is any. [5]