

End Semester Examination (R-24) FH 2026

Answer Key with marking scheme

Branch: CSE (IoT& CSIBCT)

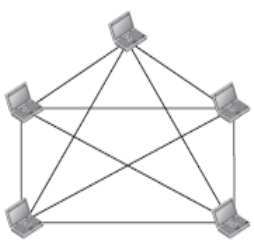
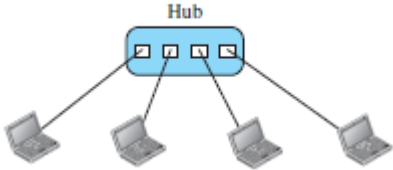
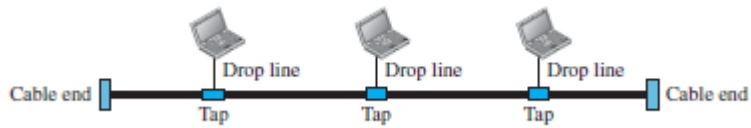
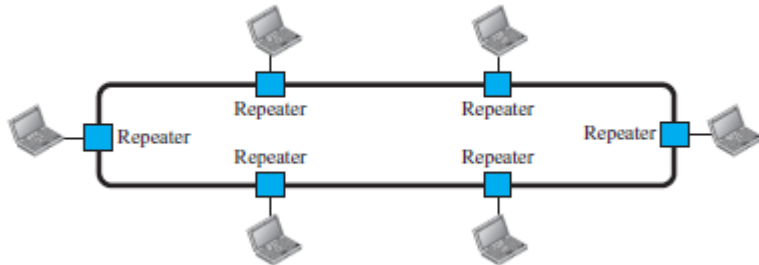
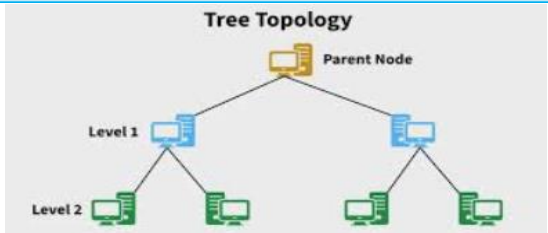
Course: Computer Network

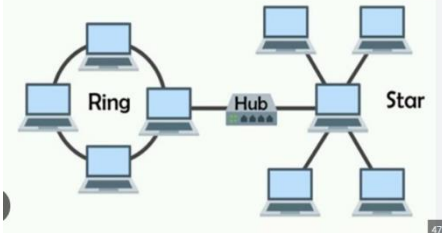
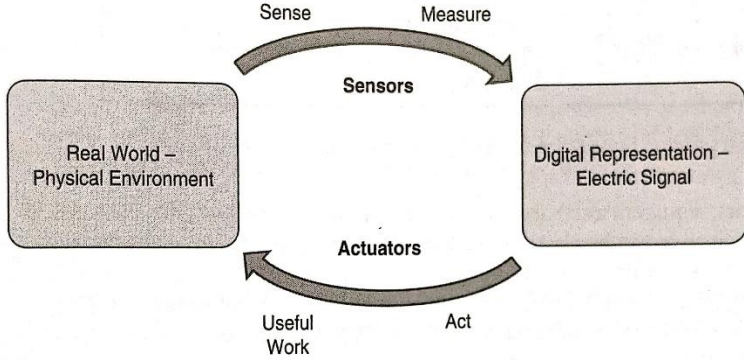
Year/ Semester: SE/IV

Course code: CSEC403

Time: 03 hours

Marks: 80

		Marks
Q. 1	Attempt any FOUR. (All questions carry equal marks)	5
A.	Any five topologies from the list: Star, Mesh, Ring, Bus and Tree topology, Hybrid Topology with diagram. 1 mark for each topology     Tree Topology 	5

		
B.	 Figure 3-4 <i>How Sensors and Actuators Interact with the Physical World</i> Diagram-2 Marks Explanation:2 Marks	5
C.	The data-link layer is located between the physical and the network layers. The datalink layer provides services to the network layer and it receives services from the physical layer. It provides node to node communication 1. framing 2. flow control 3. error control 4. MAC Addressing 5. Media Access control Give a brief explanation of all the above points. 1 Marks for each point	5
D.	An IPv4 address must follow these rules: 1)It contains exactly 4 octets 2)Each octet ranges from 0 to 255 3)Octets are separated by dots (.) i) 221.24.7.8.20-more than 4 octets-2.5M ii) 75.45.351.14-one octet is greater than 255-2.5M	5

E.	PARAMETER	TCP	UDP	5
	Connection	Connection-oriented	Connectionless	
	Reliability	Reliable as it guarantees data delivery	Unreliable-no guarantee	
	Speed	Slow	Fast	
	Ordering of data packets	Ordered and sequential	No order (packets may arrive randomly)	
	Error Handling	Error detection and correction (retransmission)	Only error detection (no correction)	
	Flow Control	Yes	No	
	Congestion Control	Yes	No	
	Header Size	20-60 bytes(larger)	8bytes(smaller)	
	Acknowledgement	Yes	No	
	Use cases	Web browsing, email etc.	VoIP, Video streaming etc.	
Each point-0.5 Marks				

F.	Figure 26.37 Iterative resolution Diagram illustrating iterative DNS resolution. The process involves a Resolver (laptop) sending a query (1) to a Local server (dns.anet.com). The Local server sends a query (2) to a Root server. The Root server responds (3) to the Local server. The Local server sends a query (4) to a Top-level domain server (.com Server). The Top-level domain server responds (5) to the Local server. The Local server sends a query (6) to a Destination server (dns.mcgraw-hill.com). The Destination server responds (7) to the Local server. The Local server then responds (8) to the Resolver. A box indicates the source is some.anet.com and the destination is engineering.mcgraw-hill.com. Diagram :2 Marks Explanation:3 Marks	5
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Given

Generator = 10101

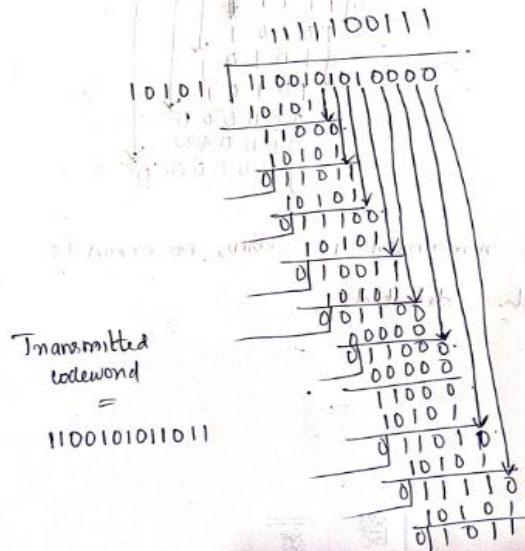
① Data bit Sequence = 110010101

$$G(x) = 1x^4 + 0x^3 + 1x^2 + 0x^1 + 1x^0$$

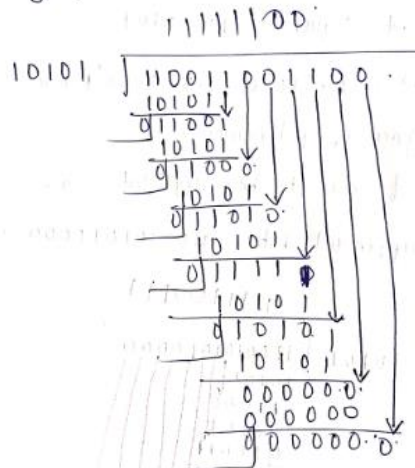
degree of polynomial = 4.

no. of zeros to be appended = 4.

∴ appended data = 1100101010000



② String of bits received = 110011001100



As the remainder is zero, no error is detected.

i)6 Marks
ii)4 Marks

C.

Figure 19.2 IP datagram

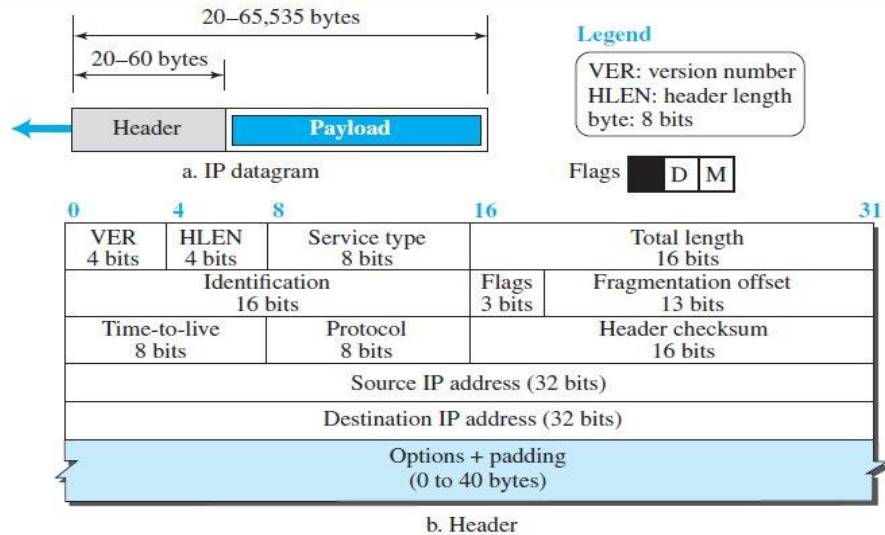


Diagram with bytes also marked properly:5 marks
Explanation:5 Marks

D.

Distance vector Routing Algorithm with explanation :6 Marks
Count to infinity Problem:-Two node instability -4Marks

10

10

```

1 Distance_Vector_Routing ( )
2 {
3     // Initialize (create initial vectors for the node)
4     D[myself] = 0

```

NETWORK LAYER

Table 20.1 Distance-Vector Routing Algorithm for a Node (continued)

```

5     for (y = 1 to N)
6     {
7         if (y is a neighbor)
8             D[y] = c[myself][y]
9         else
10            D[y] = ∞
11    }
12    send vector {D[1], D[2], ..., D[N]} to all neighbors
13    // Update (improve the vector with the vector received from a neighbor)
14    repeat (forever)
15    {
16        wait (for a vector Dw from a neighbor w or any change in the link)
17        for (y = 1 to N)
18        {
19            D[y] = min [D[y], (c[myself][w] + Dw[y])]    // Bellman-Ford equation
20        }
21        if (any change in the vector)
22            send vector {D[1], D[2], ..., D[N]} to all neighbors
23    }
24 } // End of Distance Vector

```

Figure 24.20 An example of flow control

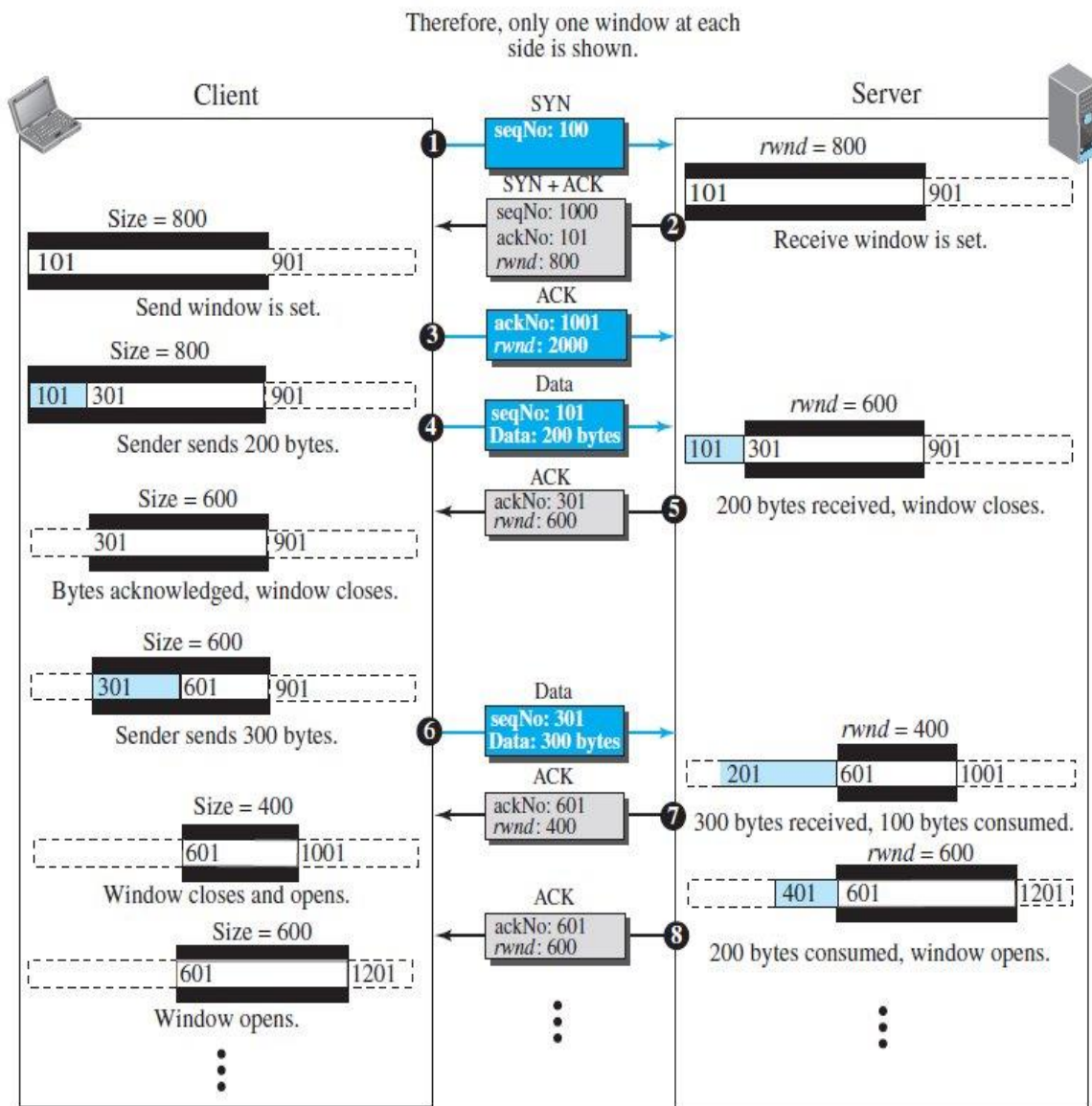
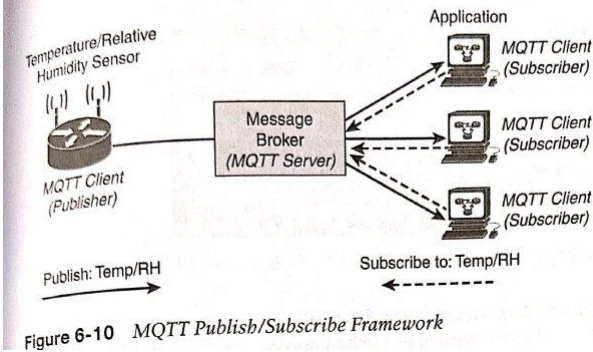


Diagram :5 Marks
Explanation 5 Marks

F.	Figure 18.25 DHCP message format <table><tr><td>0</td><td>8</td><td>16</td><td>24</td><td>31</td></tr><tr><td>Opcode</td><td>Htype</td><td>HLen</td><td>HCount</td><td></td></tr><tr><td colspan="5">Transaction ID</td></tr><tr><td colspan="2">Time elapsed</td><td colspan="3">Flags</td></tr><tr><td colspan="5">Client IP address</td></tr><tr><td colspan="5">Your IP address</td></tr><tr><td colspan="5">Server IP address</td></tr><tr><td colspan="5">Gateway IP address</td></tr><tr><td colspan="5">Client hardware address</td></tr><tr><td colspan="5">Server name</td></tr><tr><td colspan="5">Boot file name</td></tr><tr><td colspan="5">Options</td></tr></table> Fields: Opcode: Operation code, request (1) or reply (2) Htype: Hardware type (Ethernet, ...) HLen: Length of hardware address HCount: Maximum number of hops the packet can travel Transaction ID: An integer set by the client and repeated by the server Time elapsed: The number of seconds since the client started to boot Flags: First bit defines unicast (0) or multicast (1); other 15 bits not used Client IP address: Set to 0 if the client does not know it Your IP address: The client IP address sent by the server Server IP address: A broadcast IP address if client does not know it Gateway IP address: The address of default router Server name: A 64-byte domain name of the server Boot file name: A 128-byte file name holding extra information Options: A 64-byte field with dual purpose described in text Diagram with proper markings :5Marks Explanation:5 Marks	0	8	16	24	31	Opcode	Htype	HLen	HCount		Transaction ID					Time elapsed		Flags			Client IP address					Your IP address					Server IP address					Gateway IP address					Client hardware address					Server name					Boot file name					Options					10
0	8	16	24	31																																																										
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Client hardware address																																																														
Server name																																																														
Boot file name																																																														
Options																																																														
Q.3	Attempt any FOUR. (All questions carry equal marks)																																																													
A.	<table><tr><th>Feature</th><th>Twisted Pair</th><th>Coaxial Cable</th><th>Fiber Optic</th></tr><tr><td>Bandwidth</td><td>Low to Medium</td><td>Medium</td><td>Very High</td></tr><tr><td>Data Rate</td><td>Up to 1–10 Gbps</td><td>Higher than Twisted Pair</td><td>Extremely High (Tbps)</td></tr><tr><td>Transmission Distance</td><td>Short (up to 100 m)</td><td>Moderate (Few km)</td><td>Very Long (Tens–Hundreds km)</td></tr><tr><td>Cost</td><td>Low</td><td>Medium</td><td>High</td></tr><tr><td>Installation</td><td>Easy</td><td>Moderate</td><td>Difficult</td></tr><tr><td>Noise Immunity</td><td>Low (Susceptible to EMI)</td><td>Better Shielding</td><td>Very High (Immune to EMI)</td></tr><tr><td>Signal Attenuation</td><td>High</td><td>Moderate</td><td>Very Low</td></tr><tr><td>Security</td><td>Low</td><td>Moderate</td><td>Very High</td></tr></table> Write any five points.1 Mark for each point.	Feature	Twisted Pair	Coaxial Cable	Fiber Optic	Bandwidth	Low to Medium	Medium	Very High	Data Rate	Up to 1–10 Gbps	Higher than Twisted Pair	Extremely High (Tbps)	Transmission Distance	Short (up to 100 m)	Moderate (Few km)	Very Long (Tens–Hundreds km)	Cost	Low	Medium	High	Installation	Easy	Moderate	Difficult	Noise Immunity	Low (Susceptible to EMI)	Better Shielding	Very High (Immune to EMI)	Signal Attenuation	High	Moderate	Very Low	Security	Low	Moderate	Very High	5																								
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B.	The channel allocation problem is the problem of sharing a common communication channel among multiple users efficiently. It arises because multiple devices may try to transmit simultaneously, causing collisions and data loss. Types of channel allocation: Static allocation: Fixed division of channel (e.g., TDM) – no collisions but inefficient Dynamic allocation: On-demand access (e.g., ALOHA, CSMA/CD) – better utilization but collisions possible. Ensures efficient, fair, and reliable use of the communication medium.	5																																																												
C.	In this protocol, the sender sends one frame at a time and waits for an acknowledgment before sending the next one. To detect corrupted frames, we need to add a CRC to each data frame. When a frame arrives at the receiver site, it is checked. If its CRC is incorrect, the frame is corrupted and silently discarded. The silence of the receiver is a signal for the sender that a frame was either corrupted or lost. Every time the sender sends a frame, it starts a timer. If an acknowledgment arrives before the timer expires, the timer is stopped and the sender sends the	5																																																												

	next frame (if it has one to send). If the timer expires, the sender resends the previous frame, assuming that the frame was either lost or corrupted. This means that the sender needs to keep a copy of the frame until its acknowledgment arrives. When the corresponding acknowledgment arrives, the sender discards the copy and sends the next frame if it is ready. Only one frame and one acknowledgment can be in the channels at any time.	
D.	ARP Protocol - 3 Marks RARP PROTOCOL- 2 Marks	5
E.	1.Retransmission Timer-2 Marks 2.Persistence Timer-1 Mark 3.Keep-Alive Timer-1 Mark 4.Time-Wait Timer-1 Mark	5
F.	 The diagram illustrates the MQTT Publish/Subscribe Framework. On the left, a 'Temperature/Relative Humidity Sensor' is connected to an 'MQTT Client (Publisher)'. The publisher sends a message labeled 'Publish: Temp/RH' to a central 'Message Broker (MQTT Server)'. On the right, three 'MQTT Client (Subscriber)' applications are shown, each with a 'Subscribe to: Temp/RH' label. Dashed arrows indicate the flow of messages from the Message Broker to each of the three subscribers. Figure 6-10 MQTT Publish/Subscribe Framework Diagram:2 Marks Explanation:3 Marks	