Semester:7 ECE	Department of ECE	AY: 2026-27
Course Code:BEC702	Course Name:**Computer Networks and Protocols**	

Question Bank

Q.	Module-01	M	L	C
1	Define data communication. Explain the five components of a data communication system with a neat diagram.	8	L2	CO1
2	Explain the four fundamental characteristics of data flow: simplex, half-duplex, full-duplex, with diagrams.	8	L2	CO1
3	Explain the different physical structures (topologies) of a network: mesh, star, bus, ring, hybrid — with advantages and disadvantages of each.	10	L2	CO1
4	Explain circuit switching, packet switching, and message switching. Compare their characteristics.	10	L2	CO1
5	Explain the layered architecture of the TCP/IP protocol suite. Describe the function of each layer.	10	L2	CO1
6	Describe the OSI reference model with a neat diagram. Explain the responsibility of each of the seven layers.	10	L2	CO1
7	Compare and contrast the OSI model with the TCP/IP model, highlighting the similarities and differences.	8	L2	CO1
8	Explain the concept of encapsulation and decapsulation in the TCP/IP suite with a diagram showing data flow from application to physical layer.	10	L2	CO1
9	Trace the path of a message sent by an application at the source host to an application at the destination host, describing the role of each layer.	10	L2	CO1
10	With a neat diagram, explain the working of the Address Resolution Protocol (ARP). Include the ARP packet format.	10	L2	CO1
	Module-02			
11	Explain fixed-size and variable-size framing with byte stuffing and bit stuffing, giving suitable examples.	10	L2	CO2
12	Explain flow control and error control mechanisms provided by the data-link control sublayer.	6	L2	CO2
13	Describe the pure ALOHA and slotted ALOHA protocols. Derive/explain their throughput characteristics with vulnerable time diagrams.	10	L2	CO2

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14	Explain the persistence strategies used in CSMA: 1-persistent, non-persistent, and p-persistent, with flowcharts.	10	L2	CO2
15	Explain the working of CSMA/CD with a flowchart and timing diagram. Why is CSMA/CD not suitable for wireless networks?	10	L2	CO2
16	Explain the CSMA/CA protocol used in wireless LANs. Describe the roles of IFS, contention window, and acknowledgement in avoiding collisions.	10	L2	CO2
17	Explain the functions of hubs, bridges, and switches as connecting devices, distinguishing the OSI layers at which they operate.	8	L2	CO2
18	What is a Virtual LAN (VLAN)? Explain the different approaches to VLAN membership (interface, MAC address, IP address, multicast).	10	L2	CO2
19	Explain the IEEE 802.3 (Standard Ethernet) frame format with the function of each field.	10	L2	CO2
20	Explain the access control mechanism used in IEEE 802.11 wireless LANs (DCF and PCF).	8	L2	CO2
	Module-03			
21.	Explain the services provided by the network layer: packetizing, routing, and forwarding.	8	L2	CO3
22.	Differentiate between the datagram approach and virtual-circuit approach to packet switching.	8	L2	CO3
23.	Explain the address space and classful addressing scheme of IPv4, including class ranges A–E.	8	L2	CO3
24	Explain classless addressing (CIDR) in IPv4. Given a block, find the first address, last address, and number of addresses.	10	L3	CO3
25	For the IP address 190.16.42.44/27, find the number of addresses in the block, the first address, and the last address. (Numerical)	8	L3	CO3
26	Explain the Dynamic Host Configuration Protocol (DHCP) and its message exchange (DISCOVER, OFFER, REQUEST, ACK).	8	L2	CO3
27	Explain the IPv4 datagram format with the function of each field.	10	L2	CO3
28	Explain the Distance Vector Routing algorithm. Describe the Bellman-Ford equation used for updating routing tables.	10	L2	CO3
29	Explain the Link State Routing algorithm, including the creation of link	10	L2	CO3

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	state packets (LSPs) and flooding.			
30	Apply Dijkstra's algorithm to compute the shortest path tree for a given network topology. (Numerical)	10	L3	CO3
	Module-04			
31	Explain the services provided by the transport layer, including process-to-process delivery and multiplexing/demultiplexing.	8	L2	CO4
32	Differentiate between connectionless and connection-oriented transport layer protocols.	6	L2	CO4
33	Explain the Stop-and-Wait protocol with a diagram, and describe how it handles lost frames using timers and sequence numbers.	10	L2	CO4
34	Explain the Go-Back-N ARQ protocol. Illustrate the sender and receiver sliding windows with a suitable example.	10	L2	CO4
35	Explain the Selective-Repeat ARQ protocol and explain why the sender and receiver window sizes must be at most half the sequence number space.	10	L2	CO4
36	Explain the User Datagram (UDP) format with the function of each field.	6	L2	CO4
37	Explain the services and features provided by TCP: numbering system, flow control, error control, congestion control, and connection management.	10	L2	CO4
38	Explain the three-way handshake used for TCP connection establishment, with a diagram.	8	L2	CO4
39	Draw and explain the TCP state transition diagram.	10	L2	CO4
40	Explain TCP congestion control algorithms: slow start, congestion avoidance, and congestion detection (AIMD), with a graph of congestion window growth over time.	10	L2	CO4
	Module-05			
41	Explain the Hypertext Transfer Protocol (HTTP). Describe the format of HTTP request and response messages.	10	L2	CO5
42	Differentiate between persistent and non-persistent HTTP connections, and explain their impact on performance.	6	L2	CO5

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43	Explain the working of the File Transfer Protocol (FTP), including the roles of the control connection and data connection.	10	L2	CO5
44	Explain the architecture of an electronic mail system, including the roles of user agents, mail servers, and MTAs.	10	L2	CO5
45	Describe the push and pull mechanisms used in the email architecture (SMTP for push, POP/IMAP for pull).	8	L2	CO5
46	Explain the DNS name space, including the concepts of domain names and the domain name space hierarchy.	10	L2	CO5
47	Explain the DNS resolution process, distinguishing between recursive and iterative resolution, with a suitable diagram.	10	L3	CO5
48	Explain the format of DNS query and response messages.	8	L2	CO5
49	Explain the concept of Quality of Service (QoS) and the flow characteristics that determine it: reliability, delay, jitter, and bandwidth.	8	L2	CO5
50	Explain the techniques used to improve QoS: scheduling (FIFO, priority, weighted fair queuing), traffic shaping (leaky bucket, token bucket), resource reservation, and admission control.	10	L2	CO5

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Faculty Signature

***Note:**

1. All modules should contain a minimum of **10** questions each and the total number of questions must be **50**.
2. Questions can carry marks of 06, 07, 08, 09, 10 and for problems: 04 or 05.
3. Follow the RBTL as per the keywords used to frame the questions.
4. Maintain the Course Outcomes (COs) as per the syllabus.
5. M: Marks, L: RBTL, C:COs.