MITE
Invent Solutions

MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

(A Unit of Rajalaxmi Education Trust®, Mangalore)
Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi
Accredited by NAAC with A+ Grade & ISO 9001:2015 Certified Institution

Model Question Paper

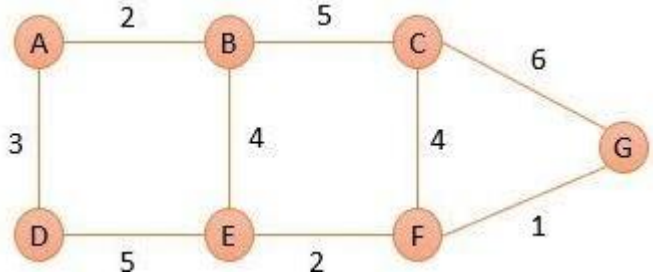
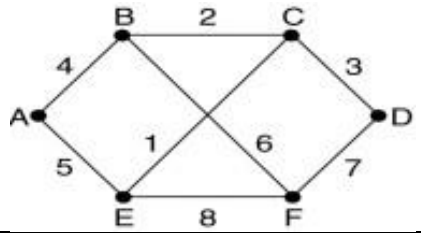
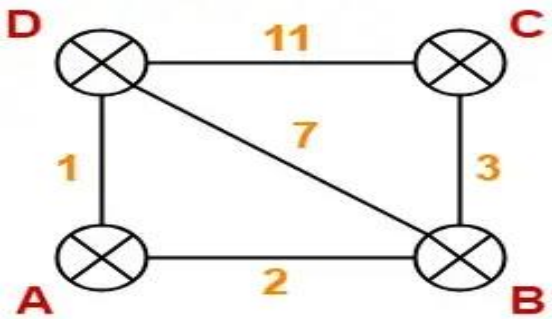
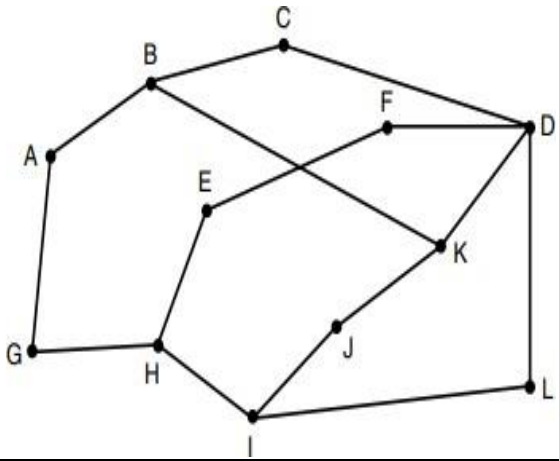
First Semester MCA Degree Examination

Computer Networks

Time: 3 Hours **Max. Marks: 100**

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M: Marks, L: RBT (Revised Bloom's Taxonomy) level, C: Course outcomes.

		Module -1	M	L	C
Q1	a.	What are the key differences between twisted pair cables and coaxial cables in terms of data transmission capacity and electromagnetic interference resistance? Give a diagrammatic explanation for the same.	10	L2	CO1
	b.	Summarize the use of layers in TCP/IP Reference Model with a neat diagram. Illustrate the differences between OSI reference model and TCP/IP.	10	L2	CO1
		OR			
Q2	a.	Compare the advantages of packet switching over circuit switching. Give related examples by clearly specifying its advantages.	10	L2	CO1
	b.	Describe how a Metropolitan Area Network (MAN) connects different geographic locations with a neat sketch.	10	L2	CO1
		Module- 2			
Q3	a.	Eight bit messages are transmitted using Hamming code. How many check bits are needed to ensure that the receiver can detect and correct single bit errors? Show the bit pattern transmitted for the message 11010011. Assume that even parity is used in the hamming code.	10	L3	CO2
	b.	Make use of the sliding window go-back-n protocol (window size =3) strategy where station P needs to send a message consisting of 9 packets to station Q. All packets are ready and available for transmission. If the 4^{th} packet that P transmits gets lost, then show the number of packets that P will transmit to Q diagrammatically.	10	L3	CO2
		OR			
Q4	a.	You receive the following data segment: 0110 0111 1100 1111 0111 1101. You know that the protocol uses bit stuffing. Show the data after de-stuffing.	10	L3	CO2
	b.	Use a rate 1/3 convolutional encoder which has generated a vectors g1=(100), g2=(111) and g3=(101).Sketch the encoder configuration, draw the state table, state transition diagram and trellis diagram for the same.	10	L3	CO2

		Module – 3			
Q5	a.	Use the Link State Routing Algorithm and apply it to the following graph with source node as 'A'. Draw the least cost path tree and the forwarding table for node 'A'. Write the algorithm too. 	10	L3	CO3
	b.	Given a weighted graph and a source vertex in the graph, find the **shortest paths** from the source to all the other vertices using Dijkstra's algorithm. Consider the source vertex as A. 	10	L3	CO3
		OR			
Q6	a.	Make use of Distance Vector Routing Algorithm and calculate the routing table for each node in a given graph and create the final routing table for the same. 	10	L3	CO3
	b.	Compute a multicast spanning tree for router C in the following network for a group with members at routers A, B, C, D, E, F, I and K. 	10	L3	CO3

Module – 4					
Q7	a.	A TCP connection is using a window size of 10000 bytes, and the previous acknowledgment number was 22001. It receives a segment with acknowledgment number 24001. Draw a diagram to show the situation of the window before and after.	10	L3	CO4
	b.	If a UDP application sends 100 packets per second and experiences a packet loss rate of 5%, how many packets successfully reach the destination each second? Calculate the effective throughput in packets per second.	10	L3	CO4
OR					
Q8	a.	The following is a dump of a UDP header in hexadecimal form: 0632000D001C E217 Determine the (a) Source port number (b) Destination port number (c) Total length of the UDP (d) Length of the data (e) Considering that an IP frame can have a maximum total length of 65535 bytes, what is the maximum length of the data in a UDP frame?	10	L3	CO4
	b.	In a TCP sliding window protocol with a window size of 8 packets, if each packet is transmitted every 50ms, calculate the time taken to send 32 packets, assuming acknowledgments are received immediately after each window is filled.	10	L3	CO4
Module – 5					
Q9	a.	A news website publishes editorial articles that remain the same for all visitors on its homepage, while breaking news updates, user comments, and personalized recommendations are generated in real time based on user activity. Analyze this scenario to differentiate static and dynamic web pages by examining how content is updated, the level of server-side processing involved, and the nature of user interaction supported by each type of page.	10	L3	CO4
	b.	A DNS server receives an average of 1200 queries per minute. Calculate the total number of queries it processes in a 24-hour period, showing the necessary steps. Explain how this information helps in understanding server workload and performance.	10	L3	CO4
OR					
Q10	a.	An e-commerce website allows users to browse products, place orders, update their profiles, and remove items from their cart using a web application. Each user action sends a request from the browser to the web server. Based on this scenario, identify and explain the different HTTP methods used for these operations and justify how each method supports effective client–server communication.	10	L3	CO4
	b.	A university develops an online student management system where students and faculty access the system through web browsers to view and update academic records stored on a central server. The system must support multiple users simultaneously and ensure secure data access. Based on this scenario, explain the architecture of the client–server model by identifying the client and server components and describing how communication and data processing take place between them.	10	L3	CO4

-*****-