

JAMIA HAMDARD
Department of Computer Science & Engineering
School of Engineering Sciences & Technology
New Delhi-110062
Examination: Odd Semester Examination 2024-25
MCA (1st Year)

Paper Name: Data Communication and Computer Networks
Time: 2.5 Hours
Follow proper numbering for answering the questions.

Paper Code: MCA-105
Maximum Marks: 60

Section-A

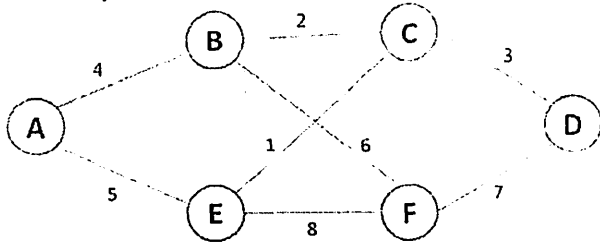
Note: Answer all questions from this section and all carry equal marks (4*5 =20 marks)

Q.N	Questions	Marks	CO	BL
1	Explain the concept of sub-netting in computer networking. For the given IP address 196.152.12.0/26 , calculate: (i) The total number of host IPs in each subnet. (ii) The range of host IPs in each subnet.	5	CO3	L3
2	Why does HTTP/1.1 suffer from HOL blocking, and what improvements do HTTP/2 and HTTP/3 introduce to eliminate this issue?	5	CO5	L4
3	Illustrate the architecture of a router with a well-labeled diagram, clearly identifying and describing its core components and functional blocks.	5	CO3	L3
4	Explain the concept of forward queries in DNS and how DNS servers assist in translating domain names into IP addresses.	5	CO5	L3

Section B

Note: Answer any **FOUR** questions from Section B and all carry equal marks (4x10=40 marks)

Q.N	Questions	Marks	CO	BL
1	(i) Why is flow control required at both the Data Link and Transport Layers? (5 Marks) (ii) Explain the relationship between MSS, MTU, and Path MTU Discovery in the context of segmentation and fragmentation. Why is Path MTU Discovery important for efficient data transmission? (5 Marks)	10	CO2	L4
2	(i) A bit word 110001101 has been received by the receiver, encoded using the Hamming Code with even parity for error detection and correction. (a) Determine whether the received code is correct or contains an error. (b) If an error exists, locate the erroneous bit and correct the code. (5 Marks) (ii) A communication system employs Cyclic Redundancy Check (CRC) for error detection. If the generator polynomial is $x^3+x^2+1=0$ and the data to be transmitted is 1010110 : (a) Perform the CRC calculation to determine the CRC value	10	CO4, CO5	L4

	(b) Append the CRC value to the original data and provide the final bit string that will be transmitted. (c) Simulate receiving the transmitted bit string, and verify whether the received CRC value is correct or not. (5 Marks).			
3	A network uses the Link State Routing Algorithm for path determination. Consider the network graph below with nodes (routers) A, B, C, D, E and F, where each edge between two nodes represents a connection with a specific cost (weight).  Using the Link State Routing Algorithm, perform the following tasks: (a) Show the Link State Packet (LSP) information for Router A. (b) Construct the Routing Table for Router A (c) Show the intermediate steps of the algorithm, including all 4 phases.	10	CO3	L5
4	(i) Explain the 3-way handshake process in TCP. Additionally, discuss the roles of MSS (Maximum Segment Size) and Window Size in this process and how they impact the communication between the client and server. (5 marks) (ii) Explain the concept of congestion control at the transport layer in computer networks. Briefly describe the three phases of congestion control. (5 marks)	10	CO4	L4
5	Using a diagram, explain how data travels from the source to the destination across the Internet, illustrating the role of each layer in the OSI model.	10	CO2	L4
6	Write short notes on any TWO: (i) E-Mail Transmission Flow (ii) DNS Resource Records (A, PTR & NS records) (iii) Classless Inter-Domain Routing (CIDR) (iv) Reverse DNS Lookup	10	CO2	L3

BL – Blooms Taxonomy Levels (1 – Remembering, 2 – Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 – Creating)