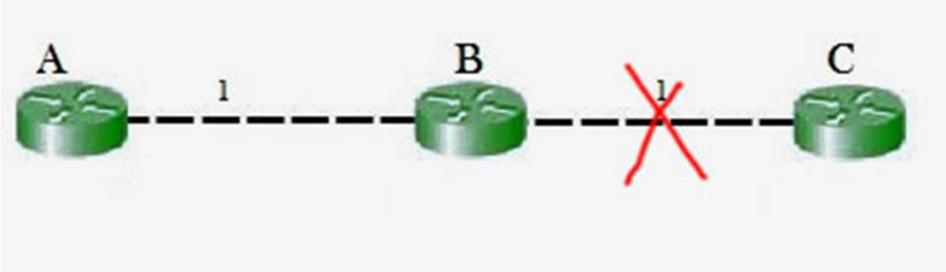
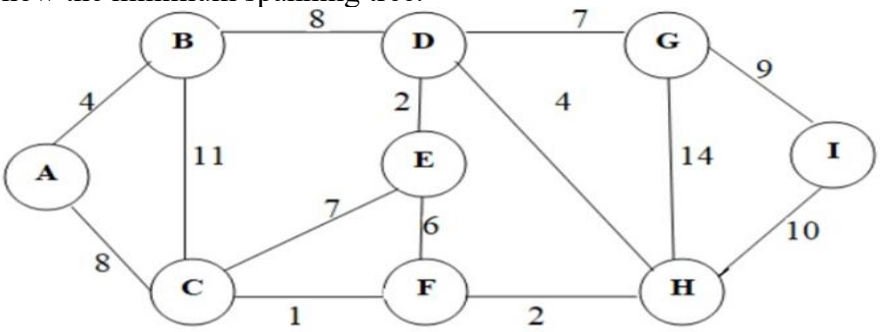
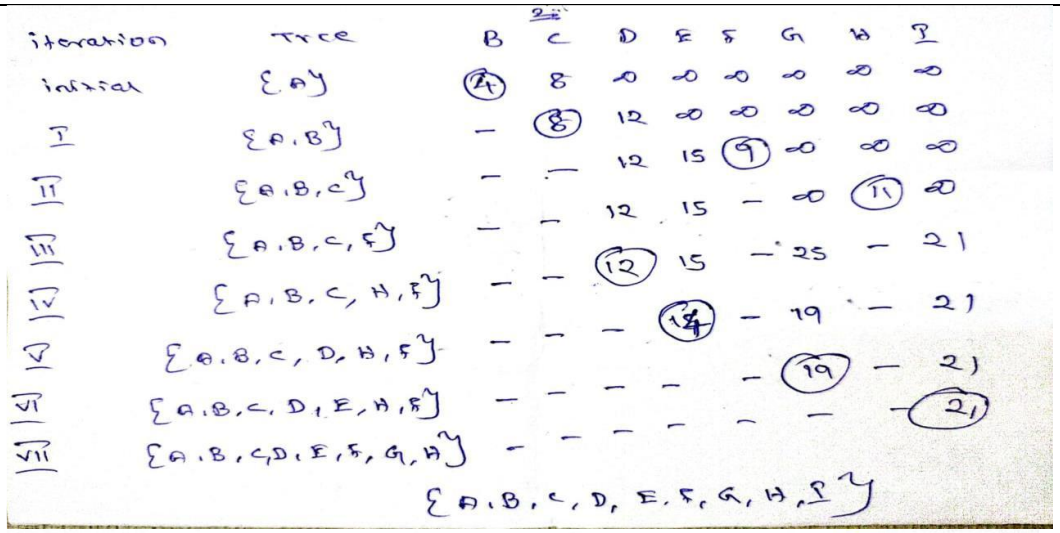
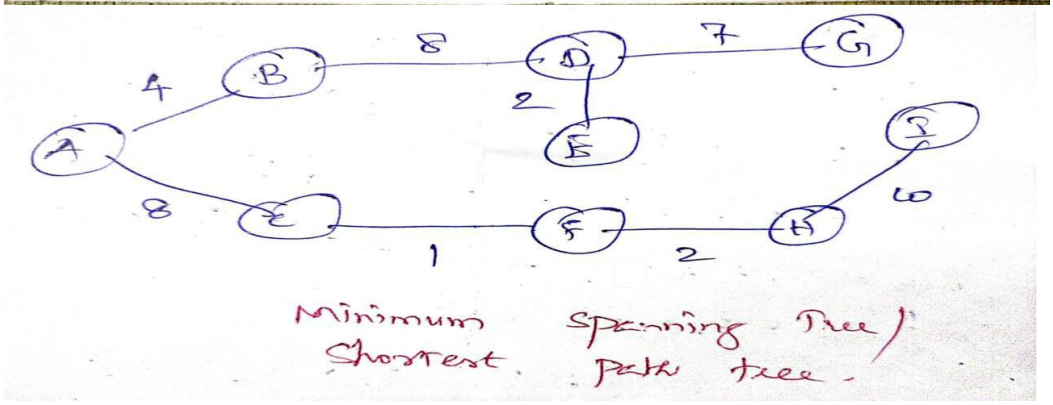
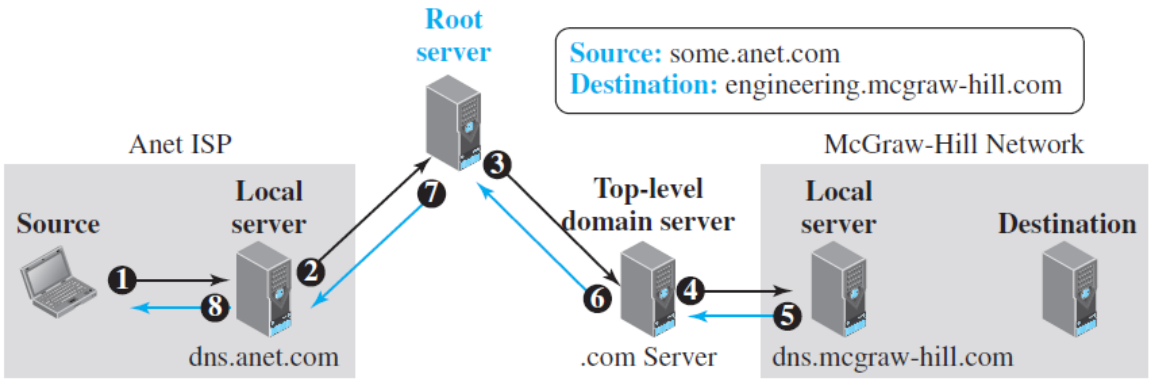
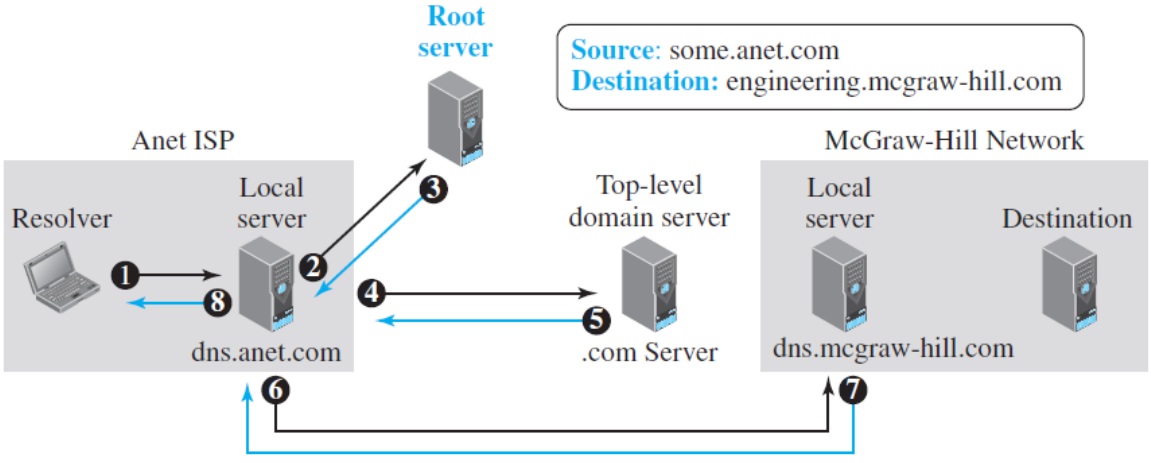
SASTRA ENGINEERING · MANAGEMENT · LAW · SCIENCES · HUMANITIES · EDUCATION DEEMED TO BE UNIVERSITY (U/S 3 of the UGC Act, 1956) THINK MERIT | THINK TRANSPARENCY | THINK SASTRA	**School of Computing** **Third CIA Examination – Apr 2025** Course Code: CSE322 Course Name: Computer Networking Principles & Components Duration: 90 minutes Max Marks: 50

Answer Key

Q.No	Questions	Marks
1	a) Suppose a TCP connection is transferring a file of 5000 bytes. The first byte is numbered 10001.What are the sequence numbers for each segment if data are sent in five segments, each carrying1000 bytes? Segment 1 → Sequence Number: 10001 Range: 10001 to 11000 Segment 2 → Sequence Number: 11001 Range: 11001 to 12000 Segment 3 → Sequence Number: 12001 Range: 12001 to 13000 Segment 4 → Sequence Number: 13001 Range: 13001 to 14000 Segment 5 → Sequence Number: 14001 Range: 14001 to 15000 b) Consider an instance of TCP's AIMD algorithm where the window size at the start of the slow start phase is 4 MSS and the threshold at the start of first transmission is 32 MSS. Assume that time out occurs during the 6th transmission and starts with 1 MSS. Find the congestion window size at the end of 9th transmission Timeout = 6th Transmission 1→ 4 2→8 3→16 4→32 (Threshold is reached) 5→33 6→34 (New Threshold = 34/2= 17) 7→1 8→2 9→4 10→8 End of 9th Congestion window size is = 8 MSS	2M 8M
2	a) Subnet the IP address 180.20.0.0 into 380 hosts in each subnet. Identify Class, Default Subnet Mask, Customized Subnet Mask. Also Find out the No. of possible subnets, Usable IP Range, Network Address and Broadcast Address only for first 4 subnets. • Class - B • Default Subnet Mask – 255.255.0.0, • Customized Subnet Mask – 255.255.254.0 • No of possible subnets - 27 = 128	7M

	Subnet 1 : • IP Range : 180.20.0.0 – 180.20.1.255 • Network Address : 180.20.0.0 • Broadcast Address : 180.20.1.255 • Usable IP Range : 180.20.0.1 – 180.20.1.254 Subnet 2 : • IP Range : 180.20.2.0 – 180.20.3.255 • Network Address : 180.20.2.0 • Broadcast Address : 180.20.3.255 • Usable IP Range : 180.20.2.1 – 180.20.3.254 Subnet 3 : • IP Range : 180.20.4.0 – 180.20.5.255 • Network Address : 180.20.4.0 • Broadcast Address : 180.20.5.255 • Usable IP Range : 180.20.4.1 – 180.20.5.254 Subnet 4 : • IP Range : 180.20.6.0 – 180.20.7.255 • Network Address : 180.20.6.0 • Broadcast Address : 180.20.7.255 • Usable IP Range : 180.20.6.1 – 180.20.7.254 b) Write short notes on Count-to-infinity problem.  If the link between B and C is disconnected, then B will know that it can no longer get to C via that link and will remove it from its table. Before B can send any updates it's possible that it will receive an update from A which will be advertising that it can get to C at a cost of 2. B can get to A at a cost of 1, so it will update a route to C via A at a cost of 3. A will then receive updates from B later and update its cost to 4. They will then go on feeding each other bad information toward infinity which is called as Count to Infinity problem.	3M
3	a) Apply Dijkstra's Routing Algorithm to find the shortest path. Assume node "A" as Root Node. Show the minimum spanning tree.  	8M

	  b) A packet has arrived in which the offset value is 100, the value of HLEN is 5, and the value of the total length field is 100. What are the numbers of the first byte and the last byte? The first byte number is 100 × 8 = 800. The total length is 100 bytes, and the header length is 20 bytes (5 × 4), which means that there are 80 bytes in this datagram. If the first byte number is 800, the last byte number must be 879.	2M
4	a) A path in a digital circuit-switched network has a data rate of 1 Mbps. The exchange of 1000 bits is required for the setup and teardown phases. The distance between two parties is 5000 km. Answer the following questions if the propagation speed is 2×10^8 m: i. What is the total delay if 1000 bits of data are exchanged during the data-transfer phase? **0.077s** ii. What is the total delay if 100,000 bits of data are exchanged during the data-transfer phase? **0.176s** iii. What is the total delay if 1,000,000 bits of data are exchanged during the data-transfer phase? **1.076s** b) What are the propagation time and the transmission time for a 2.5KB (kilobyte) message (an email) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. **Propagation time = (12,000 * 1000) / ($2.4 * 10^8$) = 50 ms** **Transmission time = (2500 * 8) / 10^9 = 0.020 ms**	6M 4M
5	a) There are only three active stations in a slotted Aloha network: A, B, and C. Each station generates a frame in a time slot with the corresponding probabilities pA = 0.2, pB = 0.3, and pC = 0.4 respectively. i. What is the probability that any station can send a frame in the first slot? ii. What is the probability that station A can successfully send a frame for the first time in the second slot? iii. What is the probability that station C can successfully send a frame for the first time in the third slot?	6M

	(i) Any station successful in slot 1 **0.452** (ii) A successfully sends for first time in slot 2 **0.076944** (iii) C successfully sends for first time in slot 3 **0.134663** b) Given the dataword 101001111 and the divisor 10111, show the generation of the CRC codeword at the sender site. Original dataword: 101001111 CRC: 1000 **Final CRC codeword = 1010011111000**	4M
6	a) Discuss DNS name resolution with neat diagrams. Recursive Resolution  Iterative Resolution  b) List out the components & message types of SNMP.	6M 4M

Component	Description
SNMP Manager	Central system that queries agents, collects data, and can send configuration commands.
SNMP Agent	Software running on network devices that collects and stores management data.
MIB (Management Information Base)	A virtual database schema that defines what can be queried or controlled.
OID (Object Identifier)	Unique identifier for each variable in the MIB.
Trap	An alert message sent from agent to manager, indicating an event (like error or failure).

Message type	Function
GetRequest GetNextRequest GetBulkRequest	Mgr-to-agent: "get me data" (instance,next in list, block)
InformRequest	Mgr-to-Mgr: here's MIB value
SetRequest	Mgr-to-agent: set MIB value
Response	Agent-to-mgr: value, response to Request
Trap	Agent-to-mgr: inform manager of exceptional event

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