Question Paper

Exam Date & Time: 01-Dec-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH. EXAMINATIONS - NOVEMBER / DECEMBER 2023
SUBJECT: CSE 3152- COMPUTER NETWORKS

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

1A)	Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three routers of rates R1 = 500 kbps, R2 = 2 Mbps, and R3 = 1 Mbps. i) Assuming no other traffic in the network, what is the throughput for the file transfer? ii) Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B? iii) Repeat (a) and (b), but now with R2 reduced to 100 kbps	(3)
1B)	Distinguish between packet switching and circuit switching using a clear example.	(3)
1C)	Analyze the intricacies of the communication process between a web client and server, specifically focusing on the exchange of HTTP request and response query messages. Delve into the significance of conditional GET and the GET method within the framework of HTTP, explain how these elements contribute to the overall functionality and efficiency of web communication.	(4)
2A)	Examine why the voice and video traffic is often sent over TCP rather than UDP in today's Internet.	(3)
2B)	Analyze the operation of alternating-bit protocol for the cases of loss packets and loss ACK with a neat diagram.	(3)
2C)	Suppose that the five measured SampleRTT values are 106 ms, 120 ms, 140 ms, 90 ms, and 115 ms. Compute the EstimatedRTT after each of these SampleRTT values is obtained, using a value of $\alpha = 0.125$ and assuming that the value of EstimatedRTT was 100 ms just before the first of these five samples were obtained. Compute also the DevRTT after each sample is obtained, assuming a value of $\beta = 0.25$ and assuming the value of DevRTT was 5 ms just before the first of these five samples was obtained. Last, compute the TCP TimeoutInterval after each of these samples is obtained.	(4)
3A)	Illustrate TCP slow start component of TCP congestion-control algorithm with neat diagram.	(3)
3B)	An organization is granted a block of addresses with the beginning address 200.58.15.0/24. The organization needs to have 4 subblocks of addresses to use in its four subnets: one subblock of 17 addresses, one subblock of 33 addresses, one subblock of 30 addresses and one subblock of 90 addresses. Draw a network topology, give IP assignments to each subblocks. Also, write subnet mask, first address and last address of each subblock.	(4)
3C)	Discuss the importance of the following fields in IPv4 datagram i) type of service ii) header checksum iii) time-to-live iv) 32-bit Destination IP address	(3)
4A)	i) How is OSPF different from RIP? ii) How does BGP use the NEXT-HOP attribute and the AS-PATH attribute?	(4)
4B)	Consider the network shown in Figure 1. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from x to all network nodes. Show how the algorithm works by computing a table.	(3)

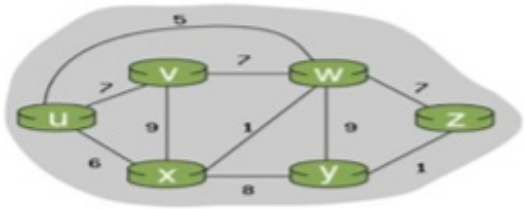

Figure 1

4C) Illustrate the Bellman-Ford algorithm for finding the shortest paths from a source vertex to all other vertices in the graph with an example scenario of a 3-node graph. Show the initial table at each node, the iterations and the final results on termination. (3)

5A) In CRC calcuations , consider the generator, G=1001, and suppose that D has the value 11111010101. What is the value of R? (3)

5B) What are the drawbacks in the hierarchical configuration of institutional LANs using traditional switches? How VLAN configurations can overcome from those drawbacks? (3)

5C) In the network diagram shown in Figure 2, Suppose Host A would like to send an IP datagram to Host B, and neither A's ARP cache contains B's MAC address nor does B's ARP cache contain A's MAC address. Further suppose that the switch S1's forwarding table contains entries for Host B and router R1 only. Thus, A will broadcast an ARP request message. What actions will switch S1 perform once it receives the ARP request message? Will router R1 also receive this ARP request message? If so, will R1 forward the message to Subnet 3? Once Host B receives this ARP request message, it will send back to Host A an ARP response message. But will it send an ARP query message to ask for A's MAC address? Why? What will switch S1 do once it receives an ARP response message from Host B? *(Assume IP and MAC symbolically. For example IP_A, MAC_A for Host A)* (4)

Figure 2

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