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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

April 2025 Semester End Make-Up Examinations

Programme: B.E. **Semester: V**

Branch: Computer Science and Engineering **Duration: 3 hrs.**

Course Code: 23CS5PCCON **Max Marks: 100**

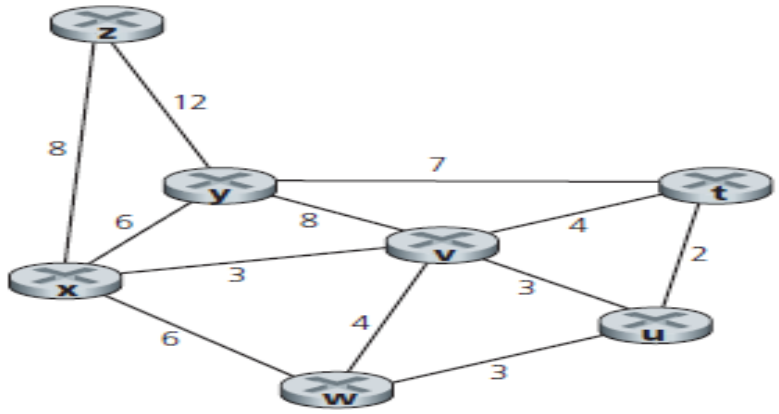
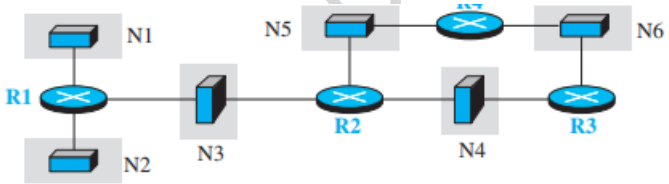
Course: Computer Networks

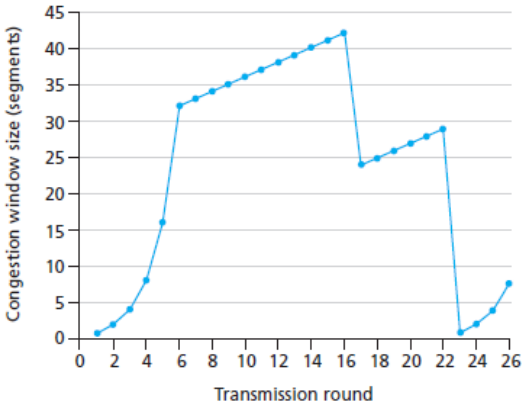
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Define Data communication. Identify the three criteria necessary for an effective and efficient network	*CO1*	*PO 1*	**6**
	b)	Identify the types of addresses (identifiers) used in each of the following layers. Describe the Functionalities of each layer a. application layer b. network layer c. data-link layer	*CO1*	*PO1*	**8**
	c)	Define DC component and its effect on digital transmission. A baseband channel has 1Mbps bandwidth. Find the bandwidth for this channel for each of the following line coding schemes. Also draw the following line coding, for the pattern 1101000110. i)Manchester ii)MLT-3 iii)2B1Q	*CO1*	*PO1*	**6**
		OR			
2	a)	Explain Frequency Division Multiplexing with a neat diagram. Calculate the required bandwidth, if a voice channel occupies a bandwidth of 4 kHz and we need to multiplex10 voice channels with guard bands of 500 Hz using FDM	*CO1*	*PO1*	**6**
	b)	Assume we have 12 sources, each creating 500 8-bit characters per second. Since only some of these sources are active at any moment, we use statistical TDM to combine these sources using character interleaving. Each frame carries 6 slots at a time, but we need to add four bit addresses to each slot. Answer the following questions. i. Find the size of the output frame in bits. ii. Calculate is the output frame rate. iii. Calculate is the duration of an output frame. iv. Find is the output data rate. v. Give the diagrammatical representation for the given scenario	*CO1*	*PO1*	**8**

		c)	Identify the types of addresses used in Virtual circuit switching. Justify that a virtual-circuit network need addresses during all three phases and sketch the delay.	*CO1*	*PO1*	**6**
			UNIT - II			
	3	a)	Describe ARP protocol with example. A host with IP address N1 and MAC address L1 has a packet to send to another host with IP address N2 and physical address L2 (which is unknown to the first host). The two hosts are on the same net work.Show the ARP request and response messages with a neat diagram.	*CO2*	*PO2*	**6**
		b)	Define Hamming distance and minimum Hamming distance w.r.t error detection. Given the dataword 101001111 and the divisor 10111. Consider length of code word is13. Show the generation of the CRC codeword at the sender site (using binary division)	*CO3*	*PO3*	**8**
		c)	Explain the need for Framing in Data link layer. Analyze the need for Byte stuffing and bit stuffing in framing with suitable example.	*CO3*	*PO3*	**6**
			OR			
	4	a)	Explain the Concept of Check sum with an algorithm and example.	*CO3*	*PO3*	**6**
		b)	In a CSMA/CD network with a data rate of 20 Mbps, the minimum frame size is found to be 512 bits for the correct operation of the collision detection process. Find the minimum frame size if we increase the data rate to i)100 Mbps ii) 1 Gbps iii)10 Gbps	*CO3*	*PO3*	**8**
		c)	(i) There are four stations trying to send bit 0 by station-1, bit 1 by station-2, bit 1 by station-3and station 4 being silent. Suppose station-3 is listening to station-2? Design the CDMA channelization to show how the data is receive by station 3. (ii) Also provide the signal wave form representing the Data on the channel, Station 1 code, inner product and summing of the values.	*CO3*	*PO3*	**6**
			UNIT - III			
	5	a)	Describe the fields in DHCP Message format. Analyze the reason behind usage of well known ports by DHCP Protocol	*CO2*	*PO2*	**6**
		b)	An organization is granted the block 130.56.0.0/16. The administrator wants to create 1024 subnets. a. Find the number of addresses in each subnet b. Find the subnet prefix. c. Find the first and the last address in the first subnet. d. Find the first and the last address in the last subnet.	*CO2*	*PO2*	**8**

		c)	Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from *x* to all nodes in the network.  	*CO2*	*PO2*	**6**
			OR			
	6	a)	Describe three strategies devised for the transition from IPv4 to IPv6 protocol.	*CO2*	*PO2*	**6**
		b)	Apply RIP for the following autonomous system. i) Show the forwarding tables after all routers are booted. ii) Demonstrate the changes in forwarding tables of R1, R2, R4 after they receive a copy of R2 table iii) Display Forwarding table for all the routers after they are stabilized  	*CO2*	*PO2*	**8**
		c)	Describe The message format of ICMPv4 and explain the type of error messages.	*CO2*	*PO2*	**6**
			UNIT - IV			
	7	a)	Explain the Segment structure of UDP and give reasons for UDP providing a Checksum. For the following three 8-bit bytes: 01010011, 01100110, 01110100. Compute Checksum for the given bytes? (Consider 8-bit sums.)	*CO2*	*PO2*	**6**
		b)	Consider Figure below. Assuming TCP Reno is the protocol experiencing the behavior shown above, answer the following questions. In all cases, you should provide a short discussion justifying your answer. a. Identify the intervals of time when TCP slow start is operating. b. After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?	*CO2*	*PO2*	**8**

			c. What is the value of ssthresh at the 18th transmission round? d. During what transmission round is the 70th segment sent?  			
		c)	Consider sending a large file from a host to another over a TCP connection that has no loss. i). Suppose TCP uses AIMD for its congestion control without slow start. Assuming cwnd increases by 1 MSS every time a batch of ACKs is received and assuming approximately constant round-trip times, how long does it take for cwnd increase from 6 MSS to 12 MSS (assuming no loss events)? ii). Find is the average throughput (in terms of MSS and RTT) for this connection up through time = 6 RTT?	*CO2*	*PO2*	**6**
			OR			
	8	a)	Analyze the need for doubling the time interval and fast retransmit in TCP.	*CO2*	*PO2*	**6**
		b)	Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 40 bytes of data, respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A. a. In the second segment sent from Host A to B, find the sequence number, source port number, and destination port number. b. If the first segment arrives before the second segment, in the acknowledgment of the first arriving segment, find the acknowledgment number, the source port number, and the destination port number. c. If the second segment arrives before the first segment, in the acknowledgment of the first arriving segment, find the acknowledgment number. d. Suppose the two segments sent by A arrive in order at B. The first acknowledgment is lost and the second acknowledgment arrives after the first timeout interval. Draw a timing diagram, showing these segments and all other segments and acknowledgments sent. (Assume there is no additional packet loss.) For each segment in your figure, provide the sequence	*CO2*	*PO2*	**8**

			number and the number of bytes of data; for each acknowledgment that you add, provide the acknowledgment number.			
		c)	Answer the following questions and Illustrate with an FSM for the below scenario: ssthreshold= 50KB 1. When a TCP congestion begins with MSS= 1 byte, find is the value of cwnd. 2. When there is a timeout, calculate will be the value of ssthresh, cwnd. 3. Identify the scenario, where there will be a transition from slowstart state to fast recovery state and what will be the value of ssthresh and cwnd. 4. When there is a timeout from congestion avoidance state, findis the value of ssthresh and cwnd.	*CO3*	*PO3*	**6**
			UNIT - V			
	9	a)	Analyze the need for cookies and illustrate the different components of cookies with a neat diagram for an HTTP request.	*CO2*	*PO2*	**6**
		b)	Give the General format of HTTP request and response message. Answer the following questions: i)Explain the mechanism used for signaling between the client and server to indicate that a persistent connection is being closed. Can the client, the server, or both signal the close of a connection. ii) Does HTTP provide encryption services. iii) Can a client open three or more simultaneous connections with a given server. iv) Either a server or a client may close a transport connection between them if either one detects the connection has been idle for some time. Is it possible that one side starts closing a connection while the other side is transmitting data via this connection? Explain.	*CO3*	*PO3*	**8**
		c)	Suppose a client wants to establish multiple connections to the same web server using port number 80 and another client needs to connect to the same server. Demonstrate the communication process for the above scenario with the neat diagram.	*CO3*	*PO3*	**6**
			OR			
	10	a)	Describe the two techniques of Mapping a name to an IP address with neat diagram.	*CO1*	*PO1*	**6**
		b)	If a client wants to get the IP address of a new website www.abc.com. Identify the protocol used for this purpose. Design the sequence of events that take place to access the IP address and show the hierarchy of various name servers	*CO2*	*PO2*	**8**
		c)	Analyze and explain the PDUs exchanged between the SNMP manager and SNMP agent with a neat diagram	*CO2*	*PO2*	**6**

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