U.S.N.										

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

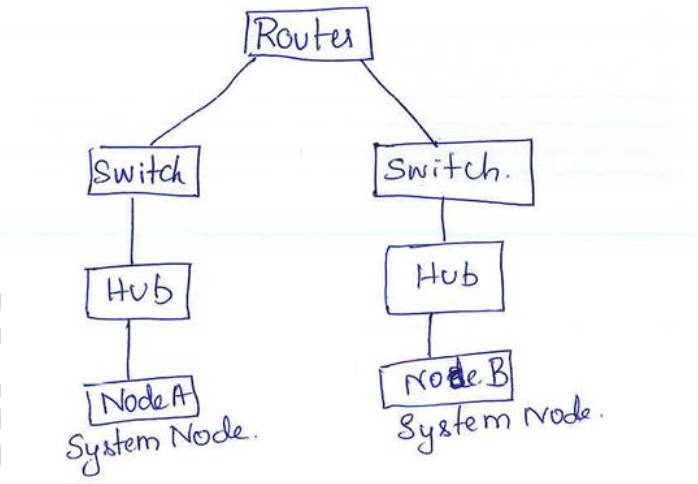
Autonomous Institute Affiliated to VTU

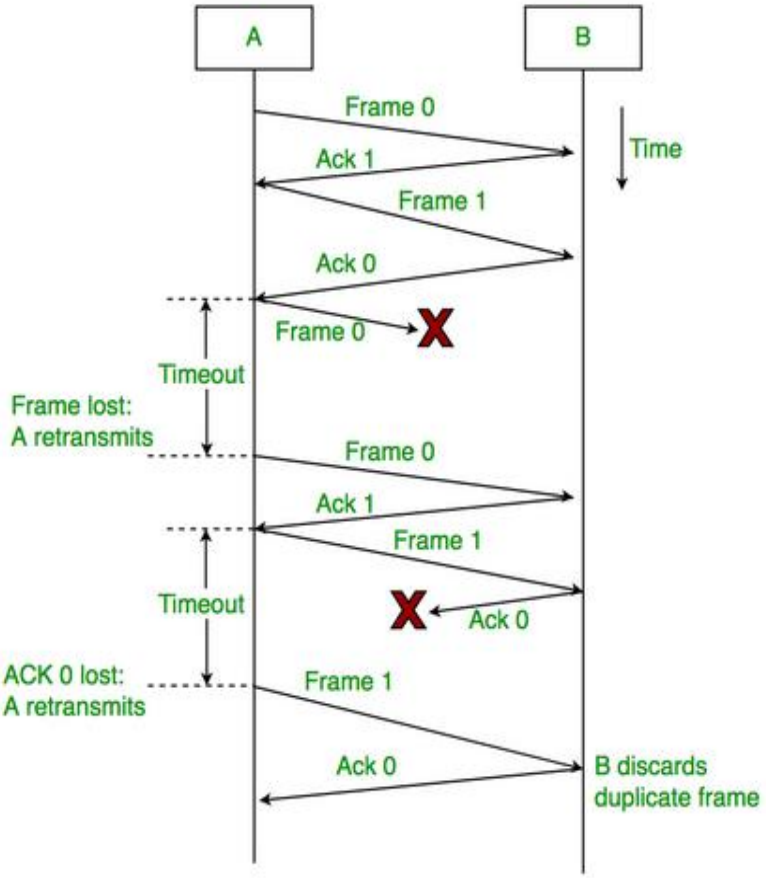
July 2024 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 22IS5PCCN1 **Max Marks: 100**
Course: Computer Networks-1

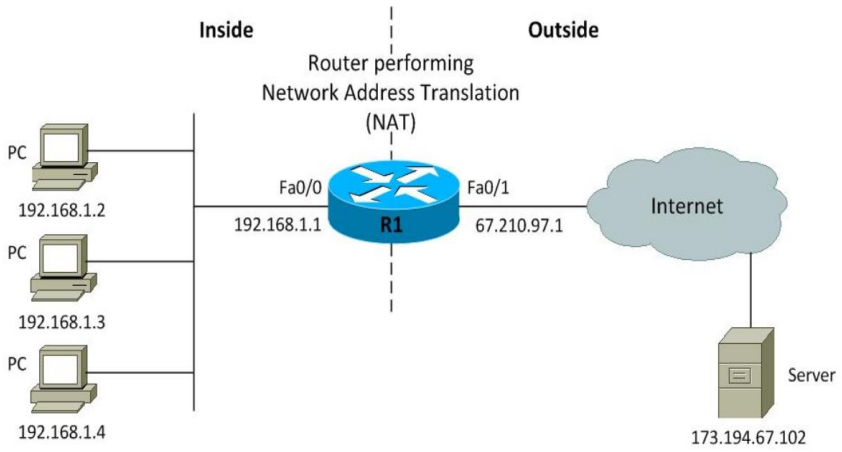
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

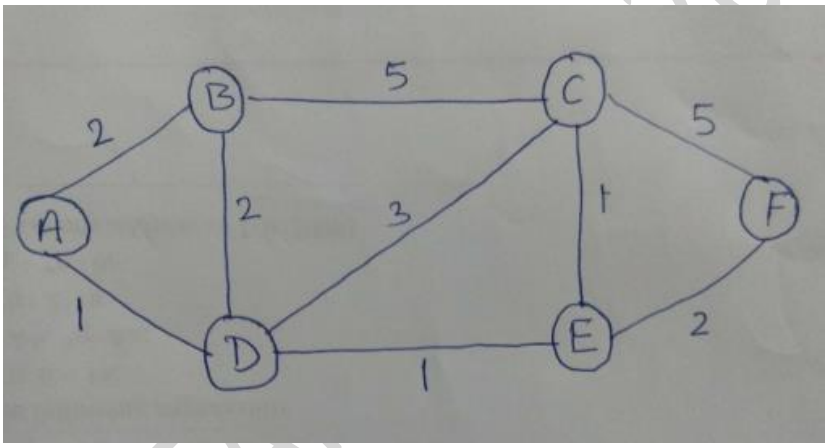
Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT – I	CO	PO	Marks
1	a)	For the given network representation below draw the layered architecture of practical internet model for communication between system node of one network (Node A) to system node of another network (Node B) and mention the protocols used in each layer. 	CO2	PO1	04
	b)	Given the bit stream 011110100001, apply the Encoding technique and draw the waveform. Assume the previous bit is positive voltage for appropriate assumptions. i) Return to zero ii) Differential Manchester iii) 2B1Q iv) MLT-3	CO2	PO1	08
	c)	Explain Delta Modulation process with a neat diagram	CO1		04

		d)	Assume we need to send 265 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need? Analyze the answer	*CO3*	*PO2*	**04**
			UNIT – II			
	2	a)	Suppose we want to transmit the message 1011 0010 0100 10110000 and protect it from errors using the CRC Generator polynomial $x^8+x^2+x^1+1$. (i) Use polynomial long division to determine the message that should be transmitted. (ii)Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred?	*CO2*	*PO1*	**10**
		b)	Sixteen-bit messages are transmitted using a 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 1101001100110101. Assume that even parity is used in the hamming code. Data is transmitted from left to right.	*CO2*	*PO1*	**06**
		c)	Identify the flow control technique applied in the below diagrams and analyse the steps for the scenarios.  	*CO3*	*PO2*	**04**
			UNIT – III			
	3	a)	Illustrate the 802.11 frame structure with a neat diagram	*CO1*		**08**

		b)	Derive the efficiency/throughput of Aloha and Slotted Aloha and compare the protocols.	*CO2*	*PO1*	**06**
		c)	Identify the assumptions to be considered for dynamic channel allocation.	*CO1*		**06**
			UNIT – IV			
	4	a)	Design a company which consists of four departments Central department is connected to all the remaining three departments in tree topology. The requirement of the host for each department is as follows. Assume the IP address 172.16.0.0\16 1. Department 1 ------10,000 hosts 2. Department 2 -------8000 hosts 3. Department 3------ 4000 hosts 4. Central department 2000 hosts.	*CO3*	*PO2*	**10**
		b)	Router A at a University contains the following routing table: *Prefix* | *NextHop* 10.210.30.0/28 | Interface0 10.1.120.0/21 | RouterC 192.168.74.0/24 | Interface1 172.16.243.0/27 | RouterB 192.168.74.192/28 | RouterD 10.1.125.32/27 | RouterE 0.0.0.0/0 | RouterZ For each of the following destination IP addresses, what does Router A do with the packet? (a) 10.1.123.74 (b) 192.168.74.195 (c) 10.210.30.17 (d) 192.168.74.200 (e) 10.1.125.28	*CO3*	*PO2*	**06**
		c)	An IP router with a maximum transmission unit of 576 bytes has received an IP packet of size 1440 bytes with an IP header included calculate the number of fragments and offset. The identification field set for the fragment is 0X1234. 20 bytes of IP header is included in MTU and IP packet.	*CO3*	*PO2*	**04**
			OR			
	5	a)	Design a company network which consists of 8 departments connected. Perform subnetting to divide the network into eight equal parts. The host IP address to be assumed is 198.0.0.0/14. For each of these subnetworks give the network address, broadcast address, first IP address assigned, the last IP address assigned and the subnet mask and CIDR. Calculate the number of hosts that can be assigned with IP address in each network.	*CO3*	*PO2*	**10**

		b)	Suppose that a host A is connected to a router R1. R1 is connected to another router R2 and R2 is connected to host B. Suppose that message that contains 900 bytes of data and 20 bytes of IP header is sent to the host for delivery. Show that total length, identification field and fragment offset fields of the IP header in each packet transmitted over the three links. Assume that link A to R1 can support maximum frame size of 1024 bytes including header of 14 byte frame header link R1 to R2 can support maximum frame size of 512 bytes including an 8 bytes frame header and the link R2-B can support maximum frame size of 512 bytes including a 12 byte frame header.	*CO3*	*PO2*	**06**
		c)	An organization requires a range of IP address to assign one to each of its 1500 computers. The organization has approached an Internet Service Provider (ISP) for this task. The ISP uses CIDR and serves the requests from the available IP address space. 202.61.0.0/17. The ISP wants to assign an address space to the organization which will minimize the number of routing entries in the ISP's router using route aggregation. Which of the following address spaces are potential candidates from which the ISP can allot any one of the organizations? I. 202.61.84.0/21 II. 202.61.104.0/21 III. 202.61.64.0/21 IV. 202.61.144.0/21	*CO3*	*PO2*	**04**
			UNIT – V			
	6	a)	Illustrate with a neat diagram steps of link state routing.	*CO2*	*PO1*	**05**
		b)	For the given figure, if all the three hosts at the private network 192.168.1.2, 192.168.1.3, 192.168.1.4 wants to communicate with the outside network through Internet with the destination public IP 172.194.67.102. Propose a solution with appropriate NAT technique for the below scenario with the NAT table.  	*CO2*	*PO2*	**05**
		c)	Explain the process of dual stack and tunneling with a neat diagram.	*CO1*		**05**

		d)	Consider a network with 6 nodes, A,B,C,D,E and F. C has three neighbors B,D and E. Distance vector routing is used and the following vectors have just come in to router C: from B: (6, 0, 9, 13, 7, 3); from D: (17, 13,7, 0, 10, 11); and from E: (6, 5,2, 8, 0, 3). The measured delays to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the expected delay.	*CO2*	*PO1*	**05**
			OR			
	7	a)	Identify the benefits of IPv6 over IPV4? Expand the address to its original form. I) 0:15::1:12:1213 II) 0:0B0E::12DF III) 2001:EC6::EF9A :0:0 IV) 2001:CB:5:38AF:953E:0:EF00:E2	*CO2*	*PO1*	**10**
		b)	Suppose that routing information is exchanged using link state routing protocol and shortest paths are computed using Dijkstra's algorithm. Find the shortest path from A to all other nodes in the network. 	*CO2*	*PO1*	**05**
		c)	Explain the following terms. i)Autonomous System ii)External BGP iii) Edge Router iv) Types of Autonomous System	*CO1*		**05**

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