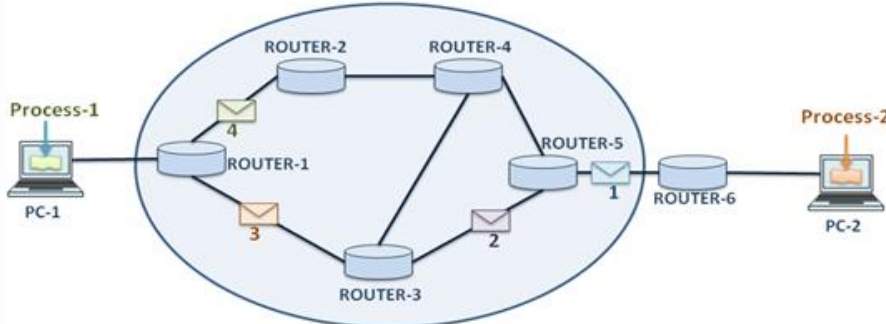




Academic year 2023-2024 (Even Sem)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING								
Date		June 2024		Maximum Marks		50		
Course Code		CY245AT		Duration		90 Minutes		
Sem		IV						
Computer Networks (Common to CS, IS, CD, AI & CY)								
Sl. No.		PART-B				M	BT	CO
1 (a)		<div><p>eth1 IP:192.168.4.250 MAC: 09:05:a0:d0:b3:12</p><p>eth1 IP: 192.168.12.101 MAC: 32:30:cd:2e:0b:3c</p><p>IP: 192.168.0.100 MAC: 32:30:cd:0b:1c:2e</p><p>A R1 R2 B</p><p>eth0 IP:192.168.0.250 MAC: 09:05:d0:be:89:02</p><p>eth0 IP: 192.168.4.200 MAC: 32:30:cd:0b:1c:b4</p><p>IP: 192.168.12.45 MAC: 3d:20:01:21:a3:0d</p></div> <p>Answer the following</p> <ol style="list-style-type: none"><li>When frame leaves A towards destination B, what will be the destination MAC of the frame?</li><li>Mention any one probable protocol at datalink and physical layer of this network if the frame is bit oriented framing protocol.</li><li>Assume R1 does not know the MAC of R2 but knows only IP address, how does it figure out the MAC of R2?</li><li>If the frame received by R1 from A has error introduced in the way, how will R1 know the frame is corrupted?</li><li>Write a neat diagram of OSI layers of B and show where the addresses mentioned fits in.</li></ol>				10	4	2
2 (a)		With a neat FSM explain Stop and Wait Protocol. List the disadvantage of this protocol.				10	3	1
3 (a)		Following data is to be sent using PPP protocol. Show the data sent by the sender and explain the various transition phases in PPP.  <b>A B ESC C FLAG ESC FLAG D</b>				10	4	5
4 (a)		Explain the importance of CSMA (Carrier Sense Multiple Access). Illustrate CSMA/CA with a neat flow diagram and its two major problems.				10	3	1

5 (a)



Router-1's table initially

Destination	Line
R-1	---
R-2	R-2
R-3	R-3
R-4	R-2
R-5	R-3
R-6	R-3

Router-3's table

Destination	Line
R-1	R-1
R-2	R-4
R-3	---
R-4	R-5
R-5	R-5
R-6	R-5

Router-5's table

Destination	Line
R-1	R-3
R-2	R-4
R-3	R-3
R-4	R-4
R-5	---
R-6	R-6

The initial network and routing table is given.

1. Explain Store and Forward concept in the network
2. If router 2 fails or crashes, show how the routing table of router 1 changes. How is the next best path/hop identified to populate the table?
3. Does all datagrams in the above network take same path? Justify your answer.

6+2+2

4

4

### COURSE OUTCOMES:

**CO1:** Apply the algorithms/techniques of routing and congestion control to solve problems related to Computer Networks.

**CO2:** Analyse the services provided by various layers of TCP/IP model to build effective solutions

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**CO4:** Exhibit Demonstrate the solutions using various algorithms/protocols available to address networking issues

**CO5:** Using modern tools by exhibiting team work and effective communication network configuration, protocol usage and performance evaluation in networks.

COs/BTL	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4
Marks	20	10		10	10			20	30

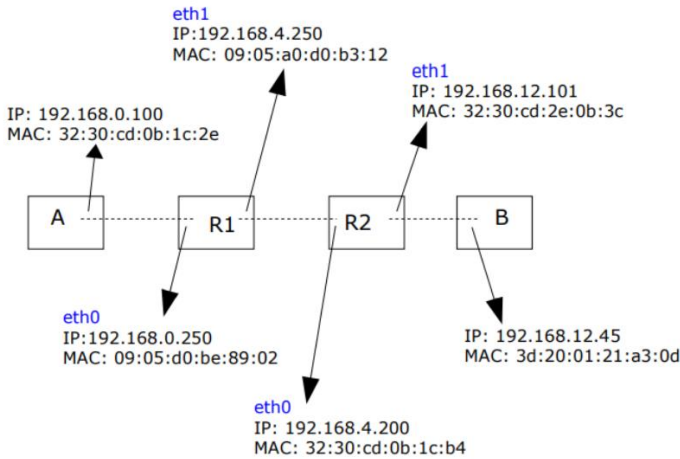
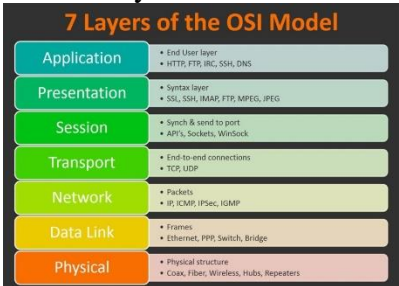


**RV College of Engineering**  
Academic year 2023-2024 (EVEN Sem)

DEPARTMENT OF  
**COMPUTER SCIENCE & ENGINEERING**

Date	June 2024	Maximum Marks	50
Course Code	CY245AT	Duration	90 Min
Sem	IV Semester	CIE -1	
<b>Computer Networks (Common to CS, IS, CD, AI &amp; CY)</b>			

**SCHEME**

Sl. No	Question	Marks	BT	CO
1.	 <ol style="list-style-type: none"> <li>09:05:d0:b2:89:02 – 1 mark</li> <li>HDL, ethernet – 1 mark</li> <li>ARP – Address resolution protocol – 1 mark</li> <li>FCS – 1 mark</li> <li>OSI layers - 6 marks</li> </ol> 	10	4	2

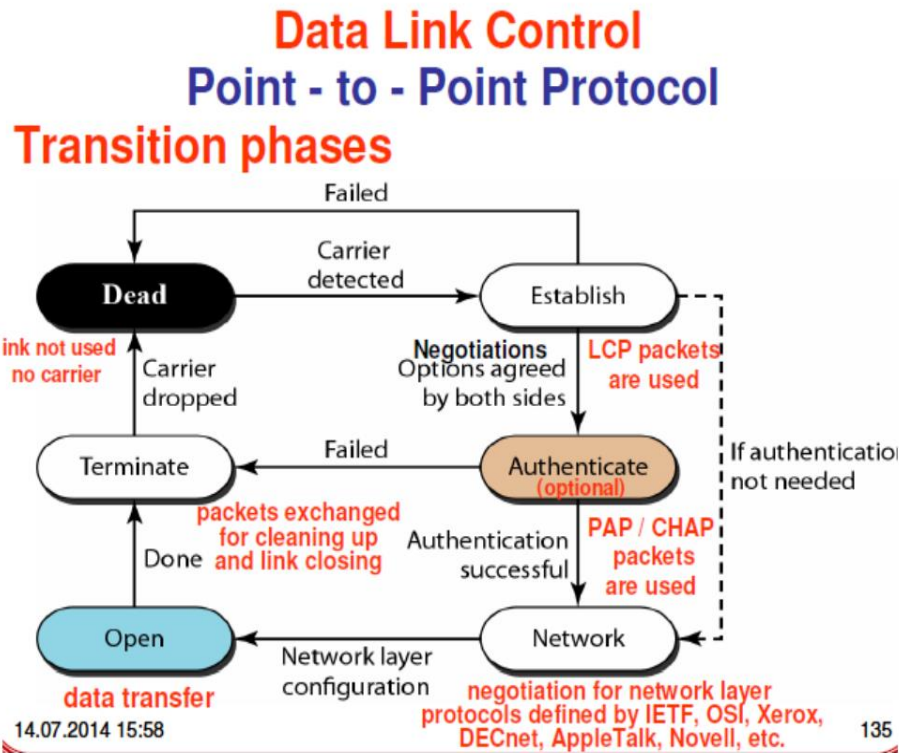


**RV College of Engineering**  
Academic year 2023-2024 (EVEN Sem)

2	<p>Sending node</p> <pre> graph LR     Start((Start)) --&gt; Ready((Ready))     Ready -- "Packet came from network layer. Make a frame, save a copy, and send the frame. Start the timer." --&gt; Blocking((Blocking))     Blocking -- "Time-out. Resend the saved frame. Restart the timer." --&gt; Blocking     Blocking -- "Corrupted ACK arrived. Discard the ACK." --&gt; Blocking     Blocking -- "Error-free ACK arrived. Stop the timer. Discard the saved frame." --&gt; Ready   </pre> <p>Receiving node</p> <pre> graph LR     Start((Start)) --&gt; Ready((Ready))     Ready -- "Corrupted frame arrived. Discard the frame." --&gt; Ready     Ready -- "Error-free frame arrived. Extract and deliver the packet to network layer. Send ACK." --&gt; Ready   </pre> <p>FSM – 4 marks Expl: 4 marks Disadv – 2 (Waste of time, bandwidth)</p>	10	3	1
3.	A B ESC ESC C ESC FLAG ESC ESC ESC FLAG D – 4 marks	10	4	5



**RV College of Engineering**  
Academic year 2023-2024 (EVEN Sem)



**Phases 6 marks**

4. CSMA is for collision detection and avoidance.  
CSMA/CA is for wireless – Disgram—3M  
Explanation-- 3 marks

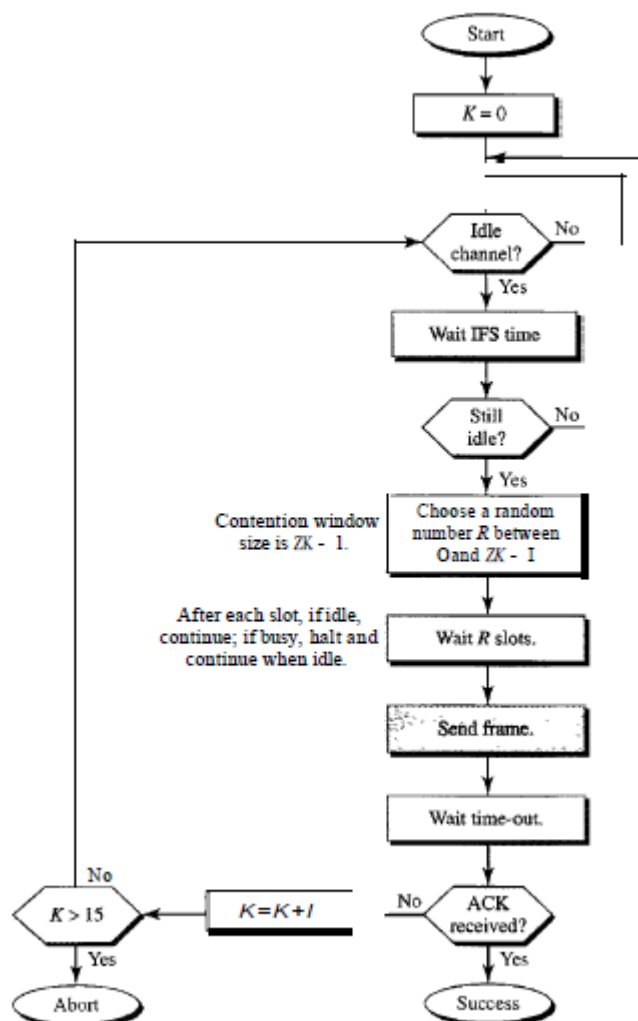
10

3

1



**RV College of Engineering**  
Academic year 2023-2024 (EVEN Sem)



Hidden terminal problem – 1 marks

Exposed terminal problem – 1 marks

5

Destination	Line
R-1	--
R-3	R3
R-4	R3
R-5	R3
R-6	R3

1 Store and forward explanation – 6 marks

2. Next best path – 2

3. No. Since it is connection less service, routing is done independent of every packet arrival, based on the status of network, routing decision can be changed for every packet – 2 mark

10

4

4



*Go, change the world*

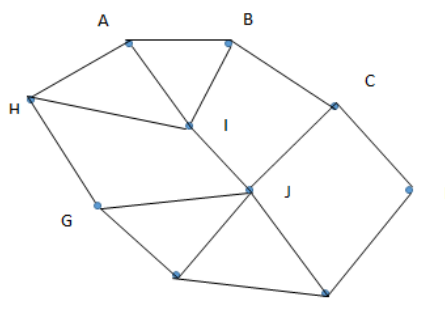
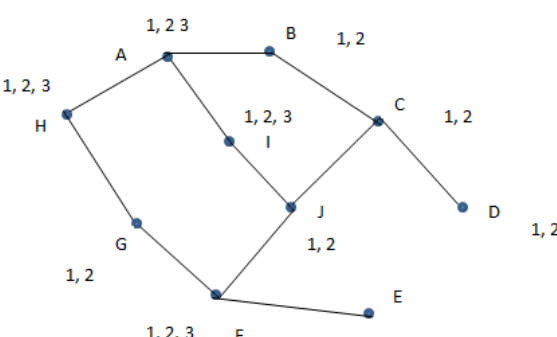
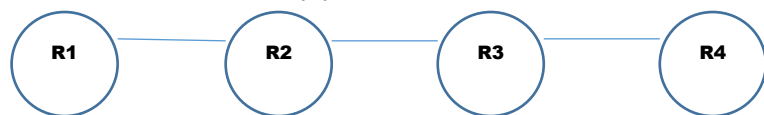
**RV College of Engineering**  
Academic year 2023-2024 (EVEN Sem)

<b>CO1:</b>	Apply the algorithms/techniques of routing and congestion control to solve problems related to Computer Networks.
<b>CO2:</b>	Analyse the services provided by various layers of TCP/IP model to build effective solutions
<b>CO3:</b>	Design sustainable networking solutions with societal and environmental concerns by engaging in Life long learning for emerging technology.
<b>CO4:</b>	Exhibit network configuration, protocol usage and performance evaluation in networks.
<b>CO5:</b>	Demonstrate the solutions using various algorithms/protocols available to address networking issues Using modern tools by exhibiting team work and effective communication

**BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks**

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	CO5	L2	L3	L4	L5	L6
	Test	Max Marks	20	10		10	10		20	30	--	--

Academic year 2023-2024 (Even Sem)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING									
Date		July 2024	Maximum Marks		60				
Course Code		CY245AT	Duration		120 Minutes				
Sem		IV							
OPEN BOOK- CIEII- Computer Networks (Common to CS, IS, CD, AI & CY)									
Sl. No.	PART-A (QUIZ)					M ar ks	B T O		
1	a	Write a sink tree for Node G in a given network below. Draw a sing tree for node 'J'. Assume that, Node I crash in sometime. Update the sink tree of J and draw its structure after the node I crashes.					2	3	3
		 <p>Fig. 1(a)</p>							
	b	Draw any 2 unique Spanning trees which includes Group1, 2 and 3 nodes for Multicasting.					2	3	2
		 <p>Fig. 1(b)</p>							
	c	Identify the general major cause of congestion and solution to control over congestion in a network when adequate resources are provided.					2	3	2
	d	For the following network below, which type of routing scheme is best suitable to route the packets from R1 to R4? Justify your answer.					2	3	3
		 <p>Fig. 1(d)</p>							
	e	Can HELLO packet is used for measuring delay? Justify your answer with reason.					2	3	2
		PART-B							
2	(a)	Find the Routing table for all the nodes of a network given below using Bellman Ford algorithm for Distance vector routing and show the routing table entries in every step. Assume the following two different scenarios and show the updated routing tables of all the nodes under each scenario: i) There is good news that, Link is established from F to C with distance value 1. ii) There is a bad news where link between C to D of distance value 1 crashes.					10	4	2



Academic year 2023-2024 (Even Sem)

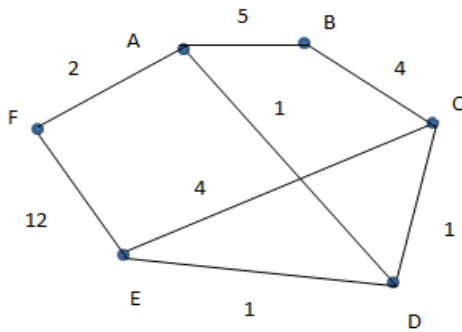


Fig. 2 (a)

3	(a)	<p>In the below scenario, find the following using Dijkstra's algorithm:</p> <ol style="list-style-type: none"> <li>Smrithi has to visit all the places identified as nodes in the network, find the best paths for Smrithi to visit all the places starting from her home.</li> <li>Find out that, from which place she can start with to cover all the places at best shortest distances to visit all the places and show the paths.</li> </ol>	10	3	3
4	(a)	<p>For a Fig. 2(a), show the following stages of link state routing:</p> <ol style="list-style-type: none"> <li>Build the link state packets and show the packet fields for each node</li> <li>Write a Packet buffer for node E with SEND and ACK flag bits</li> </ol>	10	4	4
5	(a)	<p>For the Fig.3(a), assume the below scenarios of congestion and provide the solution:</p> <ol style="list-style-type: none"> <li>If network is VC subnet, VC is built from Smrithi's home to Home to Park. Show the path from home to park after congestion occurs at Shopping point</li> <li>If it is a datagram network, there is huge traffic at Museum from Shopping point and Gym. To reduce the congestion at Museum, identify and describe the measures need to be taken to reduce the congestion.</li> </ol>	10	4	3
6	(a)	<p>Build a tree for Reverse path Forwarding for node J for network diagram given in Fig. 1(a) and compute the following:</p> <ol style="list-style-type: none"> <li>Mention the number of packets generated at every level of tree</li> <li>Mention total number of packets generated, total number of duplicate packets and total number of packets as part of sink tree.</li> </ol>	6+ 2+ 2	4	3

**COURSE OUTCOMES:**

**CO1:** Apply the algorithms/techniques of routing and congestion control to solve problems related to Computer Networks.

**CO2:** Analyse the services provided by various layers of TCP/IP model to build effective solutions

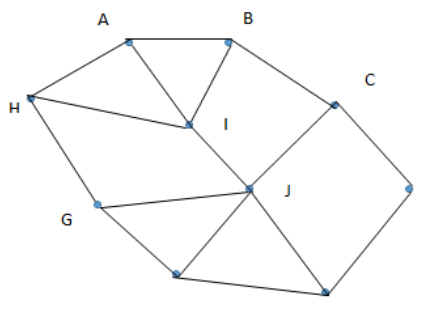
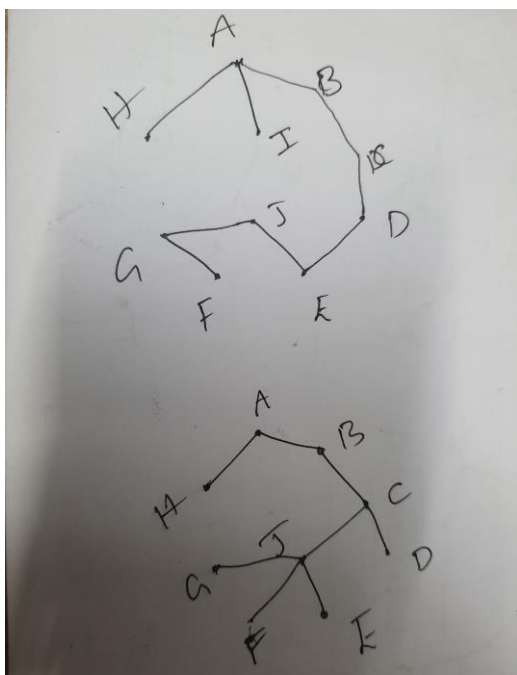
**CO3:** Design sustainable networking solutions with societal and environmental concerns by engaging in Lifelong learning for emerging technology.

**CO4:** Exhibit Demonstrate the solutions using various algorithms/protocols available to address networking issues.

**CO5:** Using modern tools by exhibiting team work and effective communication network configuration, protocol usage and performance evaluation in networks.

COs/BTL	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4
Marks	-	16	34	10	10	-	-	20	40

Academic year 2023-2024 (Even Sem)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING								
Date		July 2024		Maximum Marks		60		
Course Code		CY245AT		Duration		120 Minutes		
Sem		IV						
OPEN BOOK- CIEII- Computer Networks (Common to CS, IS, CD, AI & CY)								
Sl. No.		PART-A (QUIZ)				M ar ks	B T O	
1	a	<p>Write a sink tree for Node G in a given network below. Draw a sing tree for node 'J'. Assume that, Node I crash in sometime. Update the sink tree of J and draw its structure after the node I crashes.</p> <div></div> <p>Fig. 1(a)</p> <p>Two unique trees---2M</p> <div></div>				2	3	3
	b	Draw any 2 unique Spanning trees which includes Group1, 2 and 3 nodes for Multicasting.				2	3	2

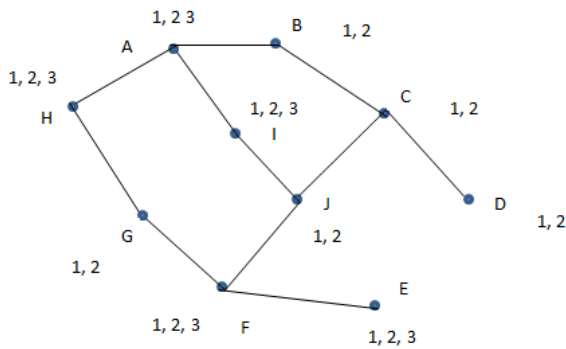
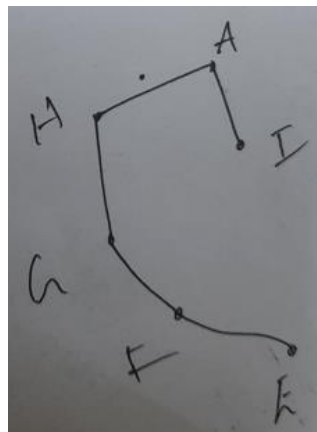
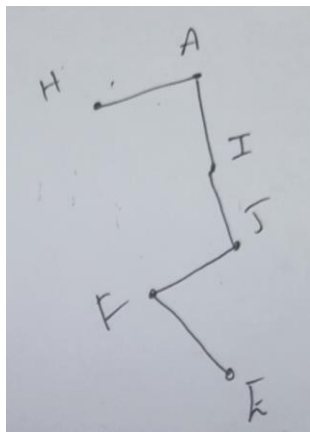


Fig. 1(b)

**Two unique trees---2M**



- c Identify the general major cause of congestion and solution to control over congestion in a network when adequate resources are provided.

**Major cause: More load on the subnet which it cannot handle---1M**

**Solution: Reduce the load on network-----1M**

- d For the following network below, which type of routing scheme is best suitable to route the packets from R1 to R4? Justify your answer.



Fig. 1(d)

**Routing scheme: Static Routing-----1M**

**Path is stored and whenever router is booting, stored path is loaded.----1M**

- e Can HELLO packet is used for measuring delay? Justify your answer with reason.

**No. It is used to only discover neighbor nodes/reachable nodes in a network.----2M**

**PART-B**

- 2 (a) Find the Routing table for all the nodes of a network given below using Bellman Ford algorithm for Distance vector routing and show the routing table entries in every step. Assume the following two different scenarios and show the updated routing tables of all the nodes under each scenario:
- There is good news that, Link is established from F to C with distance value 1.
  - There is a bad news where link between C to D of distance value 1 crashes.

Academic year 2023-2024 (Even Sem)

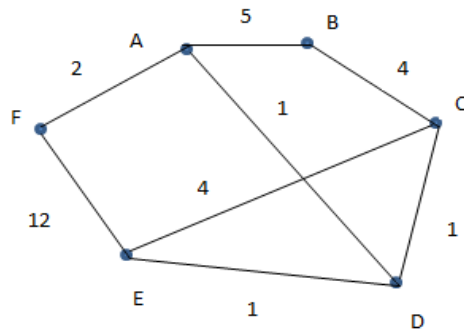


Fig. 2 (a)

**Shortest distances and neighboring nodes at every step-----4M**

	A	B	C	D	E
A	5	5	-	1	-
B	5	-	4	-	-
C	1	4	-	1	4
D	1	-	1	-	1
E	-	-	4	1	-
F	-	-	-	-	12

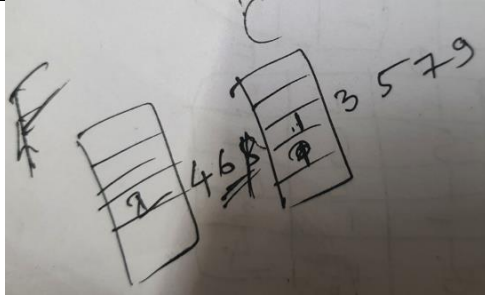
	A	B	C	D	E	F
A	-	5	9	1	2	2
B	5	-	4	5	6	7
C	2	4	-	1	2	4
D	1	5	1	-	1	3
E	2	6	4	1	-	4
F	2	7	4	3	4	-

**i)After Good news:-----4M**

(i)  $F \rightarrow C$  with value 1

	A	B	C	D	E	F
A	-	5	3	1	2	2
B	5	-	4	5	6	7
C	2	4	-	1	2	4
D	1	5	1	-	1	3
E	2	6	4	1	-	4
F	2	5	3	3	3	-

**ii)After Bad news**  
**Count to infinity problem between nodes F and C**



3 (a)

In the below scenario, find the following using Dijkstra's algorithm:

- Smrithi has to visit all the places identified as nodes in the network, find the best paths for Smrithi to visit all the places starting from her home.
- Find out that, from which place she can start with to cover all the places at best shortest distances to visit all the places and show the paths.

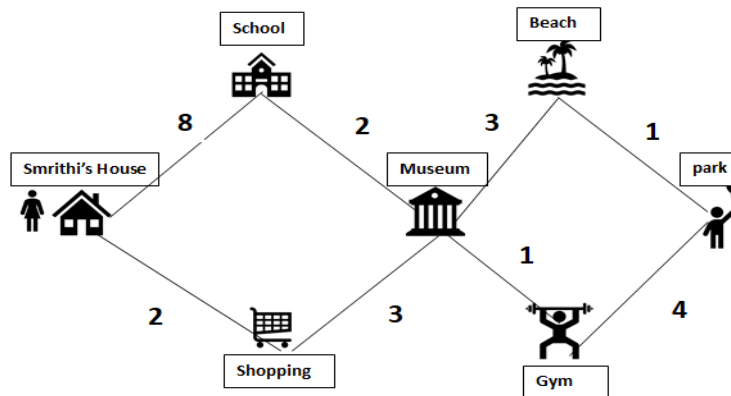
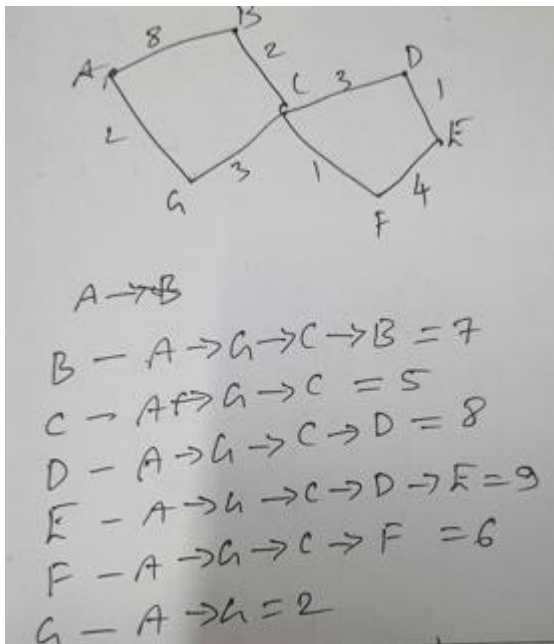


Fig. 3 (a)

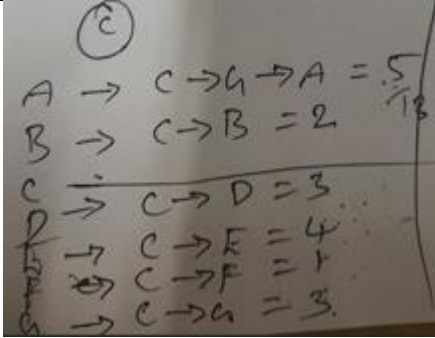
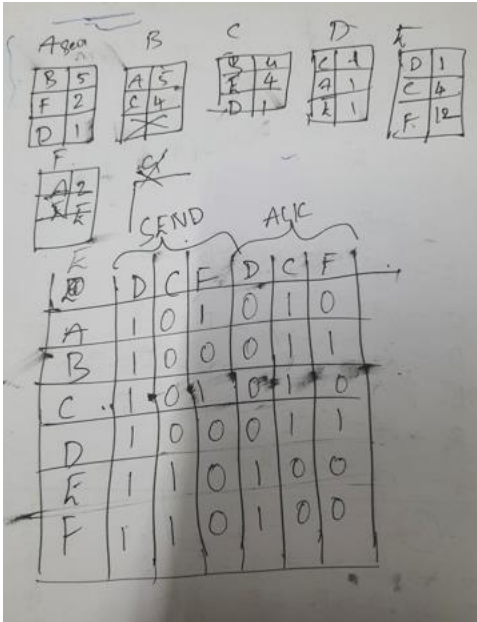
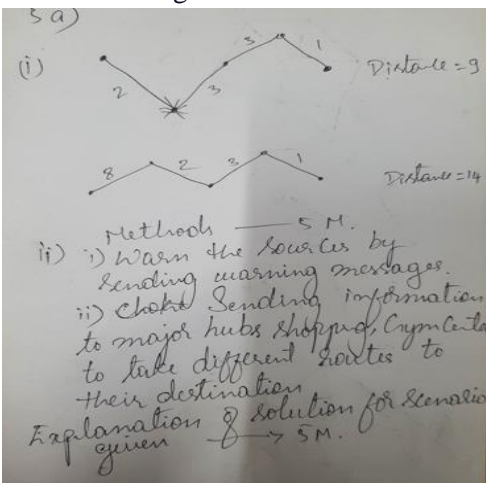
**i) Finding distances----5M**



**ii) Need to start from Museum----5M**

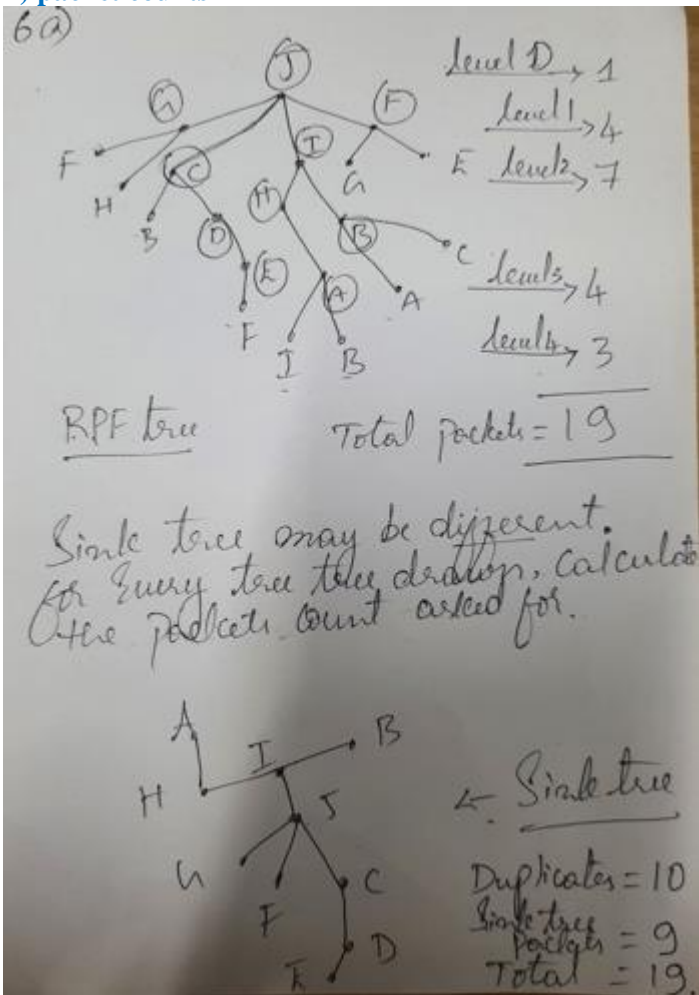
10 3 3

Academic year 2023-2024 (Even Sem)

					
4	(a)	<p>For a Fig. 2(a), show the following stages of link state routing:</p> <ol style="list-style-type: none"> <li>Build the link state packets and show the packet fields for each node</li> <li>Write a Packet buffer for node E with SEND and ACK flag bits</li> </ol> <p><b>Link state packets ---5M</b> <b>Matrix----5M</b></p> 	10	4	4
5	(a)	<p>For the Fig.3(a), assume the below scenarios of congestion and provide the solution:</p> <ol style="list-style-type: none"> <li>If network is VC subnet, VC is built from Smrithi's home to Home to Park. Show the path from home to park after congestion occurs at Shopping point----4M</li> <li>If it is a datagram network, there is huge traffic at Museum from Shopping point and Gym. To reduce the congestion at Museum, identify and describe the measures need to be taken to reduce the congestion.-----6M</li> </ol> 	10	4	3



Academic year 2023-2024 (Even Sem)

6	(a)	<p>Build a tree for Reverse path Forwarding for node J for network diagram given in Fig. 1(a) and compute the following:</p> <p>i) Mention the number of packets generated at every level of tree</p> <p>ii) Mention total number of packets generated, total number of duplicate packets and total number of packets as part of sink tree.</p> <p><b>Reverse path tree---6M</b>  <b>i) Count of packets at every level---2M</b>  <b>ii) packet counts---2M</b></p>  <p>6a)</p> <p>Level 0 → 1  Level 1 → 4  Level 2 → 7  Level 3 → 4  Level 4 → 3</p> <p>RPF tree      Total packets = 19</p> <p>Sink tree may be different.  for every tree the design, calculate the packet count asked for.</p> <p>← Sink tree</p> <p>Duplicates = 10  Sink tree packets = 9  Total = 19</p>	6+	4	3
			2+		
			2		

**COURSE OUTCOMES:**

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COs/BTL	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4
Marks	-	16	34	10	10	-	-	20	40



Academic year 2023-2024 (Even Sem)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING						
<b>Date</b>		August 2024		<b>Maximum Marks</b> 10 + 50		
<b>Course Code</b>		CY245AT		<b>Duration</b> 120 Minutes		
<b>Sem</b>		IV				
COMPUTER NETWORKS IMPROVEMENT CIE						
Sl. No.	PART-A			M	BT	CO
1	Convert the following IPv4 addresses to IPv6. i. 62.54.165.38 ii. 229.154.76.90			2	L3	2
2	Given the CIDR representations, Find the range of IP Addresses in the CIDR block. i. 20.10.30.35 / 27 ii. 100.1.2.35 / 20			2	L3	3
3	A system connected to local LAN needs to transmit a packet to the remote connected system, as well needs to receive packets from outside world, in both them scenarios how the local system would find the IP address and the Hardware address respectively.			2	L4	3
4	A router has an entry of IP address - 160.36.30.110, network mask of 255.255.254.0, in its routing table. Derive the following: i. Broadcast address for the network. ii. Network ID for the network.			2	L4	4
5	Identify type of QoS scheme used in the following scenarios: i. A corporate network is handling a mixture of traffic, including real-time video calls, emails, file downloads, and web browsing. The company wants to ensure that critical applications (like video conferencing and VoIP) receive priority over less critical applications (like bulk data transfers). ii. A company is holding a real-time video conference that requires a guarantee of low latency, high bandwidth, and minimal jitter to ensure smooth communication between participants in different locations.			2	L4	5
Sl. No.	PART-B			M	BT	CO
1	i. Classify the following scenarios under congestion and flow control: a. A data center is handling traffic from multiple clients. b. A cloud server is targeted by a Distributed Denial of Service (DDoS) attack. c. A computer sends too many print jobs too quickly to a networked printer with a small buffer. d. An IoT network with thousands of sensors floods a gateway with data, e. A microcontroller sends data faster than a connected peripheral f. A peer-to-peer file-sharing application leads to excessive traffic across the network, via the local ISP's links. ii. Suppose you have a congested network. Consider the following scenarios and provide your answer. a. Is it always possible to provide QoS on a congested network? b. Is there a way to provide QoS on a congested network? If yes or no, justify your answer.			10	L4	3
2	(a)	A router can process 15 million packets/sec. The load offered to it is 12 million packets/sec on average. i. What is the average waiting time for each packet at a router? ii. If a route from source to destination contains 7 routers, how much time is spent being queued and serviced by the router? Suppose there are 4 flows at router waiting to go out on a link having bandwidth 30Mbps. Rates of flow 1,2,3,4 are 8Mbps, 2Mbps, 4Mbps and 6Mbps respectively. If the router has implemented weighted fair queuing (WFQ), provide the equivalent bandwidth share for these flows.		10	L4	3





Academic year 2023-2024 (Even Sem)

3	(a)	A university has class B address space of 182.17.X.X. It has 45 departments each having 700 hosts. You must design an appropriate subnetting scheme to support the needs of this university. Identify the number of bits for hosts and subnets. Find the subnet mask. Design the first five subnet id's and the range of host addresses on these subnets. How many total hosts can be supported in each subnet if the department grows in future?	10	L3	2
4	(a)	State the purpose of TTL field in an IPv4 packet and its operating principle. Consider the following subnet. i. If there is a packet originating at Router 1, what should be the minimum TTL value to reach Routers 2,6,8 respectively? ii. Packet originating at Router 1 destined to Router 7 has TTL=2. Identify the sequence of operations taking place? iii. What is the significance of header checksum field? iv. If most of the fields are intact in the IPv4 header, then why header checksum is computed at each router?	10	L4	4
5	(a)	Consider sending a 2400-byte datagram that gets transmitted into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. Determine the following i) How many fragments are generated? ii) List the various IP header fields related to fragmentation. iii) What are the values in the various fields in the IP datagram(s) generated related to fragmentation? iv) Illustrate how IPv6 handles the fragmentation entirely?	10	L4	5

**COURSE OUTCOMES:**

CO1 Apply the algorithms/techniques of routing and congestion control to solve problems related to Computer Networks.

CO2 Analyse the services provided by various layers of TCP/IP model to build effective solutions.

CO3 Design sustainable networking solutions with societal and environmental concerns by engaging in lifelong learning for emerging technology.

CO4 Exhibit network configuration, protocol usage and performance evaluation in networks.

CO5 Demonstrate the solutions using various algorithms/protocols available to address networking issues using modern tools by exhibiting team work and effective communication.

COs/BTL	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4
Marks	--	12	24	12	12	--	--	14	46



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**RV COLLEGE OF ENGINEERING®**  
 (An Autonomous Institution Affiliated to VTU)  
 IV Semester B. E. Examinations Sept/Oct – 2024  
 Common to CY/CSE/ISE/AIML/CD  
**COMPUTER NETWORKS**

Time: 03 Hours

Instructions to candidates:

Maximum Marks: 100

- Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
- Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.

**PART-A**

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1	1.1	8/128 is size of the standard Ethernet Packet	01	1	2
	1.2	What is the use of Choke Packet in routing?	01	2	2
	1.3	Differentiate between Unicasting and Broadcasting.	01	3	2
	1.4	23 is the default port number used by the Telnet.	01	1	2
	1.5	List the parameters used in the Admission Control.	02	1	2
	1.6	Differentiate Routing over Forwarding.	02	3	2
	1.7	List any two QoS requirements of an E-mail application	02	1	2
	1.8	What role does RSVP play in the Integrated Services (IntServ) architecture?	02	1	2
	1.9	Differentiate Point to Point and Multi Point connection.	02	1	2
	1.10	Write any two functionalities of Network layer.	02	2	2
	1.11	List any two advantages of IPv6 over IPv4.	02	2	2
	1.12	Differentiate between CSMA and CSMA/CD.	02	3	2

**PART-B**

2	a	Write any four salient features of HDLC and PPP protocol.	08	2	2
	b	Draw the TCP/IP protocol suite. Describe the functionality of each layer in detail.	08	2	2
3	a	Differentiate Datagram Subnet and Virtual- Circuit Subnet.	08	2	2
	b	For the following network find the shortest path using Dijkstra algorithm. Consider the node 'A' as the source node and node 'G' as destination.			
		<p align="right">A-B-E-G</p>	08	3	1
		<b>OR</b>			
4	a	What is routing Protocol? Discuss the following:			
		(i) Properties of routing protocol.	08	2	2
		(ii) Classification of routing protocol.			
	b	With the help of a neat diagram, illustrate the use of Multicast Routing.	08	3	1



5	a	Discuss packet scheduling algorithms in detail.	08	2	2
	b	Describe the QoS requirements of Telephone and Videoconferencing applications.	08	2	2
<b>OR</b>					
<del>6</del>	<del>a</del>	Discuss Expedited Forwarding and Assured Forwarding in detail.	08	2	2
	<del>b</del>	Describe Explicit Congestion notification and Hop-by-Hop Backpressure.	08	2	2
7	a	Summarize Address Resolution Protocol in detail.	08	2	2
	<del>b</del>	Discuss the IPv6 header format with a neat diagram.	08	2	2
<b>OR</b>					
8	a	Identify and discuss the network management protocol used to dynamically assign an IP address to any device on a network allowing it to communicate using IP. <i>(PMP)</i>	08	2	2
	<del>b</del>	Draw the network model and describe the working of Exterior Gateway Routing Protocol.	08	2	2
<del>9</del>	<del>a</del>	Discuss any six differences between UDP and TCP.	08	2	2
	<del>b</del>	With a neat diagram describe three-way handshake in detail.	08	2	2
<b>OR</b>					
10	a	Draw the header format of TCP segment header and discuss each field in detail.	08	2	2
	b	Describe the architecture of World Wide Web in detail.	08	2	2