REG.NO.:

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

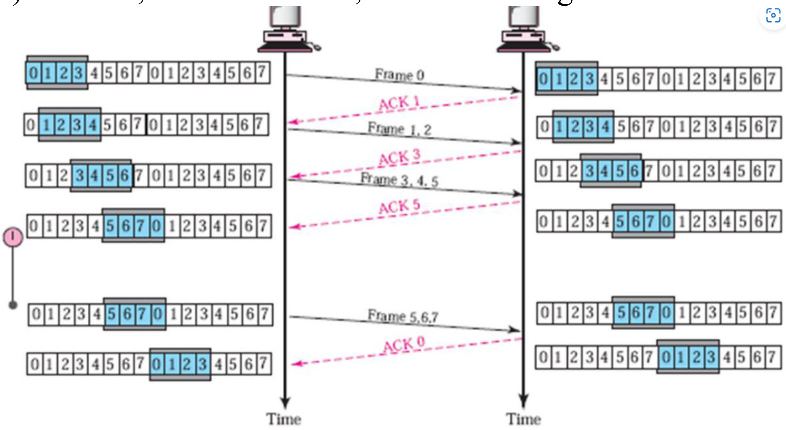
SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: D1+TD1

Programme Name & Branch	:	**B.Tech (CSE & Specializations)**
Course Code and Course Name	:	**BCSE308L & Computer Networks**
Faculty Name(s)	:	**Common for all**
Class Number(s)	:	**Common for all**
Date of Examination	:	**16.10.2024**
Exam Duration	:	**90 minutes**

Maximum Marks: 50

ANSWER KEY

Q. No	**Question**	M
1.	a. Draw the sender and receiver windows for a system using Selective Repeat ARQ (3-bits for sequence number), given the following: i) Frame 0 is sent; frame 0 is acknowledged. ii) Frame 1 and 2 are sent; frames 1 and 2 are acknowledged. iii) Frame 3, 4 and 5 are sent; frame 4 is acknowledged; timer for frame 5 expires. iv) Frame 5, 6 and 7 are sent; frames 4 through 7 are acknowledged.  i) Frame 0 is sent; frame 0 is acknowledged. Sender Window: [0, 1, 2] Receiver Window: [0, 1, 2] Frame 0 sent, acknowledged. Move the window. ii) Frame 1 and 2 are sent; frames 1 and 2 are acknowledged. Sender Window: [3, 4, 5] Receiver Window: [0, 1, 2] Frames 1 and 2 sent, acknowledged. Move the window. iii) Frame 3, 4, and 5 are sent; frame 4 is acknowledged; timer for frame 5 expires. Sender Window: [5, 6, 7] Receiver Window: [0, 1, 2] Frame 4 acknowledged, but frame 5 not acknowledged (timeout). Resend frame 5. iv) Frame 5, 6, and 7 are sent; frames 4 through 7 are acknowledged.	7

	Sender Window: [0, 1, 2] Receiver Window: [0, 1, 2] Frames 5, 6, and 7 sent, frames 4 through 7 acknowledged. Move the window.	
	b. There are n stations in a slotted LAN. Each station attempts to transmit with a probability p in each time slot. What is the probability that ONLY one station transmits in a given time slot? The probability of that chosen station transmitting is p, and the probability of the other $n-1$ stations not transmitting is $(1-p)^{n-1}$. Since there are n ways to choose which station will transmit, the total probability P that exactly one station transmits in a given time slot is given by: $$P = n \cdot p \cdot (1-p)^{n-1}$$ So, the probability that only one station transmits in a given time slot is: $$P = np(1-p)^{n-1}$$ 1. The probability that a specific station transmits in a time slot is p. 2. The probability that a specific station does not transmit is $1-p$.	3
2.	Assume an organization's network starting address is 10.10.0.0/16 and divided into equal no. of addresses for 16 blocks. Find the following: i. Class ____________ and default Subnet mask for the class ____________ ii. No. of addresses in each subnet works____________________________ iii. Subnet mask of each subnetwork ______________________ iv. CIDR of each subnetwork ____________________________ v. Write Starting address and end address of each subnetwork. vi. How many bits borrowed for subnetwork from host bits? **i. Class and Default Subnet Mask** • **Class:** A (since the first octet is 10, which is in the range of 1 to 126) • **Default Subnet Mask for Class A:** 255.0.0.0 or /8 **ii. Number of Addresses in Each Subnetwork** To determine the number of addresses in each subnet, we first note that the original /16 network provides: • Total addresses: 232−16=216=65,5362^{32-16} = 2^{16} = 65,536232−16=216=65,536 addresses Dividing this into 16 equal blocks: • Addresses per subnet: 65,53616=4,096\frac{65,536}{16} = 4,0961665,536=4,096 addresses per subnet. **iii. Subnet Mask of Each Subnetwork**	10

	Since we are dividing the /16 network into 16 subnets, we need to determine how many bits are required to create these subnets. The formula for the number of subnets is 2n2^n2n, where nnn is the number of bits borrowed. To get 16 subnets: • 2n=162^n = 162n=16 → n=4n = 4n=4 Thus, we borrow 4 bits from the host part of the address. The new subnet mask will be: • Original mask: /16 • New mask: /16 + 4 = /20 **iv. CIDR of Each Subnetwork** The CIDR (Classless Inter-Domain Routing) notation for each subnetwork will be /20. **v. Starting Address and End Address of Each Subnetwork** With a /20 subnet mask, each subnet has 4,0964,0964,096 addresses. The starting addresses of each subnet can be calculated as follows: 1. **Subnet 1:** 10.10.0.0 – 10.10.15.255 2. **Subnet 2:** 10.10.16.0 – 10.10.31.255 3. **Subnet 3:** 10.10.32.0 – 10.10.47.255 4. **Subnet 4:** 10.10.48.0 – 10.10.63.255 5. **Subnet 5:** 10.10.64.0 – 10.10.79.255 6. **Subnet 6:** 10.10.80.0 – 10.10.95.255 7. **Subnet 7:** 10.10.96.0 – 10.10.111.255 8. **Subnet 8:** 10.10.112.0 – 10.10.127.255 9. **Subnet 9:** 10.10.128.0 – 10.10.143.255 10. **Subnet 10:** 10.10.144.0 – 10.10.159.255 11. **Subnet 11:** 10.10.160.0 – 10.10.175.255 12. **Subnet 12:** 10.10.176.0 – 10.10.191.255 13. **Subnet 13:** 10.10.192.0 – 10.10.207.255 14. **Subnet 14:** 10.10.208.0 – 10.10.223.255 15. **Subnet 15:** 10.10.224.0 – 10.10.239.255 16. **Subnet 16:** 10.10.240.0 – 10.10.255.255 **vi. How Many Bits Borrowed for Subnetwork from Host Bits** We borrowed **4 bits** from the host bits to create the 16 subnets.	
3.	a. An IP datagram has arrived with partial information the header 45000054 00030000 2006….. i. What is the header size- **20 bytes** ii. Are there any options in the packet- **NO** iii. What is the size of data – **84-20=64 Bytes** iv. Is the packet fragmented -**NO** v. How many more routers can the packet travel to? **32 Routers** vi. What is the protocol number of the payload being carried by the packet? **06-TCP**	8

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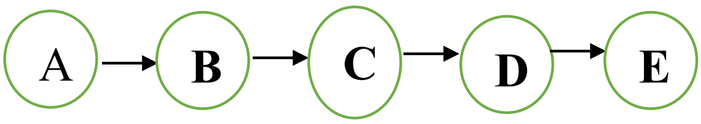
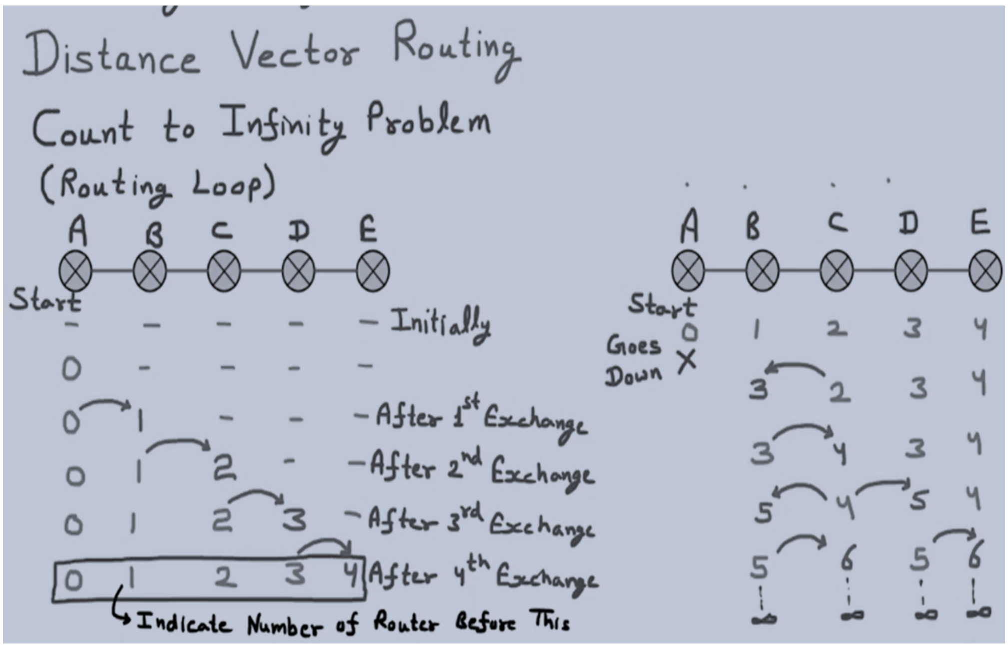
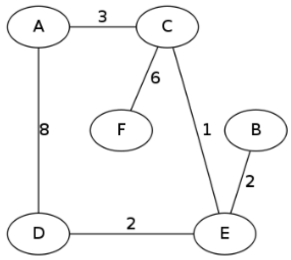
	b. Identify the status of flags in IP header format for different scenarios listed below: i) Datagram size=200 bytes and MTU= 400 bytes U-0 D-1 M-0 ii) Datagram size=1500 bytes and MTU= 400 bytes U-0 D-0 M-1	2
4.	a. Routers 1 to 5 are connected as shown below. Exhibit the count to infinity problem if node A fails. Assume the distance between the routers are 1. What is the solution to this problem?   	5
	b. For the network on the right, give distance vector tables when, each node knows only the distances to its neighbours.	5



Information at Node — Distance to Reach Node

	A	B	C	D	E	F
A	0	∞	3	8	∞	∞
B	∞	0	∞	∞	2	∞
C	3	∞	0	∞	1	6
D	8	∞	∞	0	2	∞
E	∞	2	1	2	0	∞
F	∞	∞	6	∞	∞	0

Information at Node — Distance to Reach Node

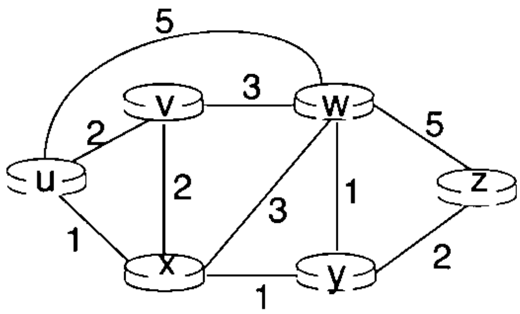
	A	B	C	D	E	F
A	0	∞	3	8	4	9
B	∞	0	3	4	2	∞
C	3	3	0	3	1	6
D	8	4	3	0	2	∞
E	4	2	1	2	0	7
F	9	∞	6	∞	7	0

Information at Node — Distance to Reach Node

	A	B	C	D	E	F
A	0	6	3	8	4	9
B	6	0	3	4	2	9
C	3	3	0	3	1	6
D	8	4	3	0	2	9
E	4	2	1	2	0	7
F	9	9	6	9	7	0

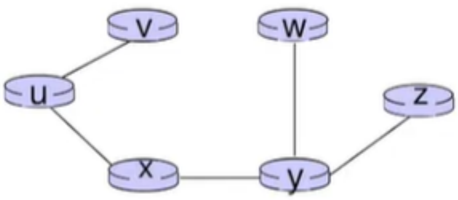
5.	Explore the below mentioned formulate the routing table using the below given equation, where each router shares its knowledge of its neighbours with every other router in the internetwork.	10

D(v)= min(D(v), D(w) + c(w,v))
w- source node; v- destination node
c(w,v)-link cost from node w to v
D(v)-current value of cost from source to destination



Step	N'	D(v),p(v)	D(w),p(w)	D(x),p(x)	D(y),p(y)	D(z),p(z)
0	u	2,u	5,u	1,u	∞	∞
1	ux	2,u	4,x		2,x	∞
2	uxy	2,u	3,y			4,y
3	uxyv		3,y			4,y
4	uxyvw					4,y
5	uxyvwz					

resulting shortest-path tree from u:



resulting forwarding table in u:

destination	link
v	(u,v)
x	(u,x)
y	(u,x)
w	(u,x)
z	(u,x)