SRM Institute of Science and Technology
College of Engineering and Technology

DEPARTMENT OF ECE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-23 (EVEN)

Batch 2
SET B

Test: CLAT-2 **Date: 05.04.2023**
Course Code & Title:18ECC303J & COMPUTER COMMUNICATION NETWORK **Time: 08:00 to 09:40 AM**
Year & Sem: III & VI **Max. Marks: 50**

Course Articulation Matrix:

	18ECC303J - Computer Communication Networks	**Program Outcomes (POs)**														
CO	**Course Outcomes (COs)**	**Graduate Attributes**												**PSO**		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	Express the basic services and concepts related to internetworking.	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-
2	Define the basic OSI model architecture and its lower layer functions.	-	-	2	-	-	-	1	-	-	-	-	-	-	-	3
3	Apply the various Network Layer concepts, mechanisms and protocols.	-	-	3	-	-	1	2	-	-	-	-	-	-	-	-
4	Analyze the services and techniques of Transport Layer.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	3
5	Produce the various services and protocols in Application Layer.	-	-	2	-	-	-	-	-	-	-	-	-	-	-	3
6	Evaluate the various Networking concepts and Routing protocols.	-	-	-	-	1	-	-	-	-	-	-	2	-	-	3

Q. No	**PART – A (10 X 1 = 10 Marks)** **Answer all the questions**	**Mark**	**BL**	**CO**	**PO**
1	Which layer is considered as end user layer? a. **Application** b. Session c. Presentation d. Transport	**1**	**1**	**2**	**3**
2	The network layer is responsible for the _____ delivery of a packet. a. Source to source b. **Source to destination** c. Process to process d. Process to source	**1**	**2**	**3**	**3**
3	In CRC redundancy is used for which purpose? a. High data rate b**. Error detection** c. blocking message d. Source coding	**1**	**1**	**2**	**7**
4	Stop and wait protocol is _____ in nature. a. Full-duplex b. Simplex c. **Half-duplex** d. Multiplex	**1**	**1**	**2**	**7**
5	What type of acknowledgement is used in Go-Back-n protocol? a. Null frame b. Error centric c. Individual d. **Cumulative**	**1**	**1**	**2**	**7**
6	CSMA-CD is used in which type of network?	**1**	**1**	**2**	**3**

<table>
<tr><td></td><td>a. WiFi b. GSM c. Ethernet LAN d. Bluetooth</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>Which one is not a HDLC frame?

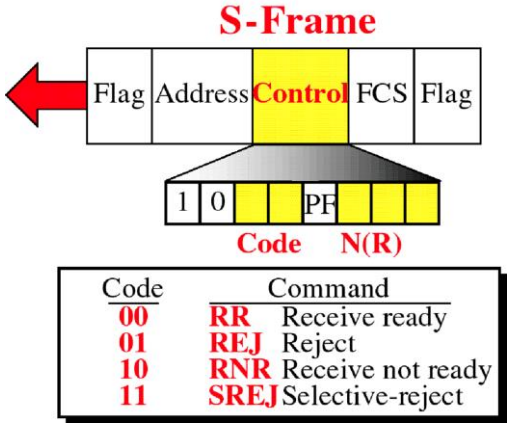
a. I-Frames b. H-Frames c. S-Frames d. U-Frames</td><td>1</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>8</td><td>_____ does not actually connect two LANS, it connects two segment of the same LAN

a. Gateways b. Switches c. Repeaters d. Routers</td><td>1</td><td>1</td><td>2</td><td>7</td></tr>
<tr><td>9</td><td>Change the IP addresses (10000001 00001011 00001011 11101111) from binary notation to hexadecimal notation.

a. 0X810B0BEF or 810B0BEF$_{16}$
b.0XC10B0BFF or B10B0BEF$_{16}$
c. 0XB10B0BEF or 810B0BFF$_{16}$
d. 0X71BB0BEF or 810B0BBF$_{16}$</td><td>1</td><td>3</td><td>3</td><td>7</td></tr>
<tr><td>10</td><td>Find the class of the address: 193.14.56.22

a. Class A b. Class B c. Class C d. Class D</td><td>1</td><td>1</td><td>3</td><td>7</td></tr>
<tr><td></td><td>PART -B (4 X 4 = 16 Marks)
Answer Any Four Questions</td><td></td><td></td><td></td><td></td></tr>
<tr><td>11</td><td>Compare Stop and wait protocol with Sliding window?

Ans: [Marks: 1 for 1 difference, 1+1+1+1]
<table><tr><th>Parameter</th><th>Stop and Wait Protocol</th><th>Sliding Window</th></tr><tr><td>Mechanism</td><td>In Stop and Wait protocol, the sender sends a single frame and waits for an acknowledgment from the receiver.</td><td>In Sliding window protocol, the sender sends multiple frames at a time and retransmits the damaged frames.</td></tr><tr><td>Window Size</td><td>1</td><td>Varies from 1 to n, where n is the number of bits allotted in the protocol to represent the sequence number</td></tr><tr><td>Sorting</td><td>Sorting of frames is not needed.</td><td>Sorting of frames helps to increase the efficiency of the protocol.</td></tr><tr><td>Efficiency</td><td>Stop and Wait protocol efficiency is formulated as 1/(1+2a) where a is a ratio of propagation delay to the transmission delay.</td><td>Sliding Window protocol efficiency is formulated as N/(1+2a) where N is no. of window frames and a is a ratio of propagation delay to the transmission delay.</td></tr><tr><td>Duplex</td><td>Stop and Wait protocol is half-duplex in nature.</td><td>Sliding Window protocol is full-duplex in nature.</td></tr></table></td><td>4</td><td>2</td><td>2</td><td>3</td></tr>
<tr><td>12</td><td>What is Hamming distance? Find the Hamming distance between (000) and (011)?
Ans: [Marks: 2+2]
• The Hamming distance between two words is the number of differences between corresponding bits.
• Hamming distance d(000, 011) is 2 because;
$000 \oplus 011$ is 011 (two 1s)</td><td>4</td><td>3</td><td>2</td><td>3</td></tr>
<tr><td>13</td><td>Discuss different types of modes in HDLC?
Ans: [Marks: 1+1+2]
<u>Normal Response Mode (NRM):</u></td><td>4</td><td>1</td><td>2</td><td>3</td></tr>
</table>

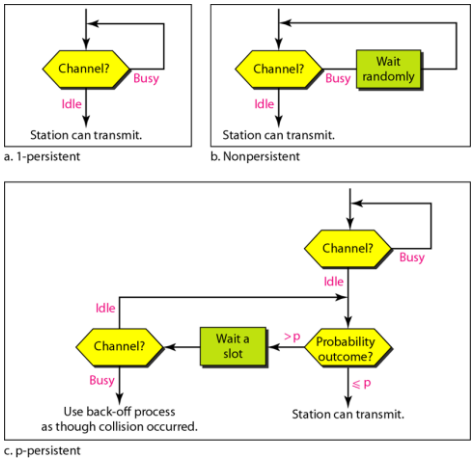
	• Refers to standard Primary – Secondary relationship • In this mode, secondary device must have permission from the primary device before transmitting • Once permission has been granted, the secondary may initiate a response transmission of one or more frames containing data. <u>Asynchronous Response Mode (ARM):</u> • Refers to standard Primary – Secondary relationship • In this mode, secondary device may initiate transmission without permission from the primary whenever the channel is idle. • All transmissions from a secondary must be made to the primary for relay to a final destination. <u>Asynchronous Balanced Mode (ABM):</u> • In this mode, all stations are equal • Only combined stations connected in point to point are used. • Either combined station may initiate transmission with the other combined station without permission.				
14	**Draw Supervisory frame (S- Frame) diagram and write its different types?** **Ans:** **[Marks: 2 + 2]**  Code Command 00 RR Receive ready 01 REJ Reject 10 RNR Receive not ready 11 SREJ Selective-reject S-frames are of 4 types; • Receive ready (RR) • Receive not ready (RNR) • Reject (REJ) • Selective reject (SREJ)	**4**	**1**	**2**	**3**
15	**What is subnetting?** **What is the subnetwork address if the destination address is 200.45.34.56 and the subnet mask is 255.255.240.0?** **Ans:** **[Marks: 2 + 2]** <u>Subnetting:</u> • A network is divided into several smaller networks with each subnetwork (or subnet) having its subnetwork address	**4**	**3**	**3**	**3**

	Address → ***11001000 00101101 00100010 00111000*** ***Subnet Mask*** → ***11111111 11111111 11110000 00000000*** ***Subnetwork Address*** → ***11001000 00101101 00100000 00000000.*** • The subnetwork address is 200.45.32.0				
16	**What is packetizing? Why does network layer protocol provide this service to the transport layer?** **Ans: [Marks: 1 + 3]** • Encapsulating the payload in a network-layer packet at the source and decapsulating the payload from the network-layer packet at the destination is called Packetizing. • The source host receives the payload from an upper layer protocol, adds a header that contains the source and destination addresses and some other information that is required by the network-layer protocol and delivers the packet to the data-link layer. • The destination host receives the network-layer packet from its data-link layer, decapsulates the packet, and delivers the payload to the corresponding upper-layer protocol.	**4**	**2**	**3**	**3**
	PART – C (2 X 12 =12 Marks) **Answer Any Two Questions**				
17	**a. What are the persistence methods in CSMA? Explain all in detail with flow diagram.** **b. Explain in detail about CSMA/CD protocol.** **Ans: [Marks: 6 + 6]** Part A: CSMA: • There are three persistence methods in CSMA as detailed below. 1- Persistent: • In this method, after the station finds the line idle, it sends its frame immediately (with probability 1). • This method has the highest chance of collision because two or more stations may find the line idle and send their frames immediately. Non persistent: • In this method, a station that has a frame to send senses the line, If the line is idle, it sends immediately. If the line is not idle, it waits a random amount of time and then senses the line again. • The nonpersistent approach reduces the chance of collision because it is unlikely that two or more stations will wait the same amount of time and retry to send simultaneously. • However, this method reduces the efficiency of the network because the medium remains idle when there may be stations with frames to send.	**6 + 6**	**1**	**2**	**3**

p- Persistent:

- The p-persistent method is used if the channel has time slots with a slot duration equal to or greater than the maximum propagation time.
- The p-persistent approach combines the advantages of the other two strategies.
- It reduces the chance of collision and improves efficiency. In this method, after the station finds the line idle it follows these steps:

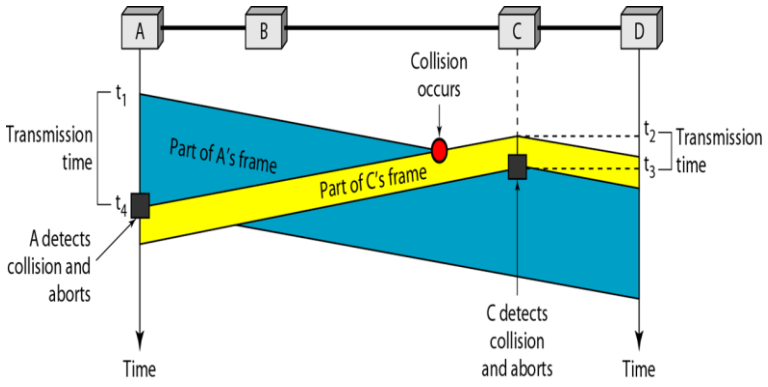
- With probability p, the station sends its frame.
  With probability q = 1 − p, the station waits for the beginning of the next time slot and checks the line again.
  a. If the line is idle, it goes to step 1.
  b. If the line is busy, it acts as though a collision has occurred and uses the back-off procedure.



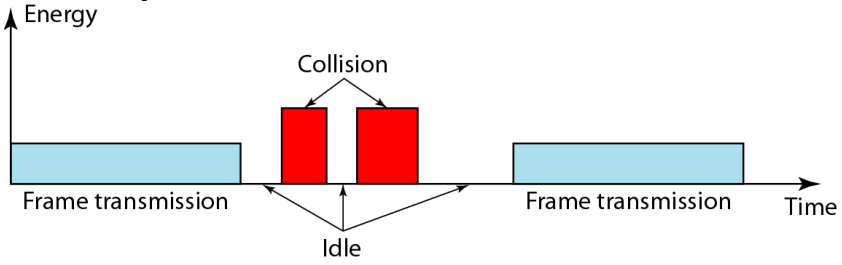
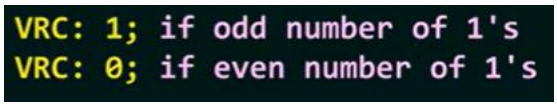
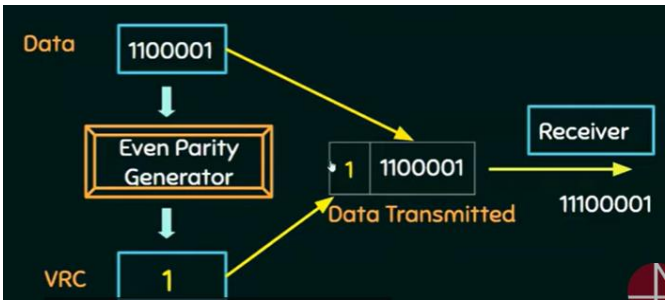
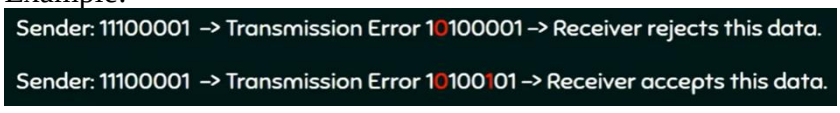
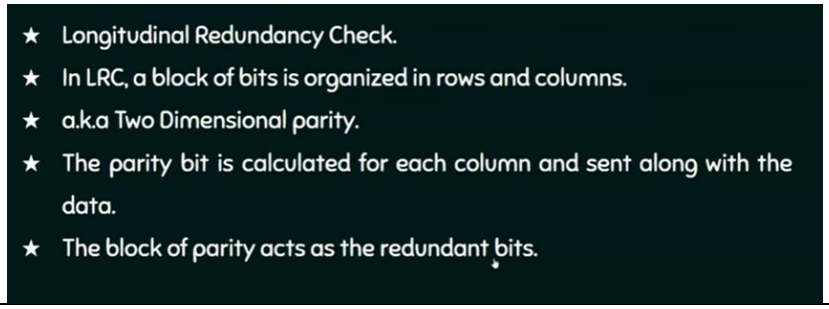
(Flow Diagram)

b. CSMA/CD Protocol:

- In CSMA, a station monitors the medium after it sends a frame to see if the transmission was successful.
- If there is a collision, the frame is sent again. Each station continues to send bits in the frame until it detects the collision



- We can say that the level of energy in a channel can have three values: zero, normal, and abnormal.
- At the zero level, the channel is idle. At the normal level, a station has successfully captured the channel and is sending its frame.
- At the abnormal level, there is a collision and the level of the energy is twice the normal level.

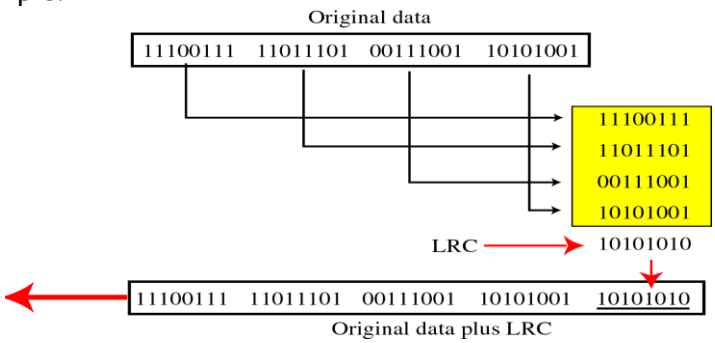
	• A station that has a frame to send or is sending a frame needs to monitor the energy level to determine if the channel is idle, busy, or in collision mode  				
18	**Explain the following error detection methods as per instructions; Explain VRC, Explain LRC, Explain CRC and find CRC for the data blocks 100100 with divisor 1101** **Ans:** **[Marks: 3 + 3 + 6]** VRC: • Also called parity check • Parity bit or redundant bit • A parity bit is added to every data unit so that the total number of 1s(including the parity bit) becomes even for even-parity check or odd for odd-parity check • VRC can detect all single-bit errors. • It can detect multiple-bit or burst errors only if the total number of errors is odd.   Example:  LRC:  	**12**	**3**	**2**	**3**

Performance of LRC

★ LCR increases the likelihood of detecting burst errors.

★ If two bits in one data units are damaged and two bits in exactly the same positions in another data unit are also damaged, the LRC checker will not detect an error.

Example:



CRC:

- The CRC is a network method designed to detect errors in the data and information transmitted over the network. This is performed by performing a binary solution on the transmitted data at the sender's side and verifying the same at the receiver's side.

CRC Generation at Sender Side

1. Find the length of the divisor 'L'.
2. Append 'L-1' bits to the original message.
3. Perform binary division operation.
4. Remainder of the division = CRC.

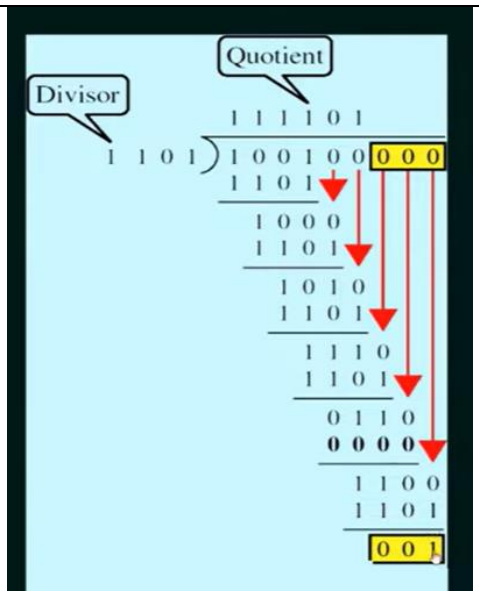
Note:

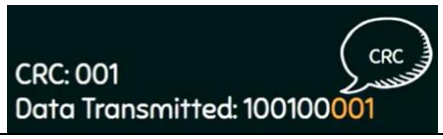
The CRC must be of L-1 bits.

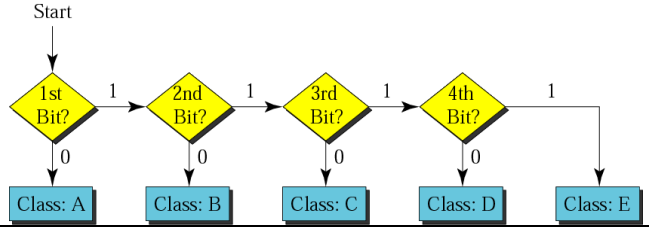
A	B	A XOR B
0	0	0
0	1	1
1	0	1
1	1	0

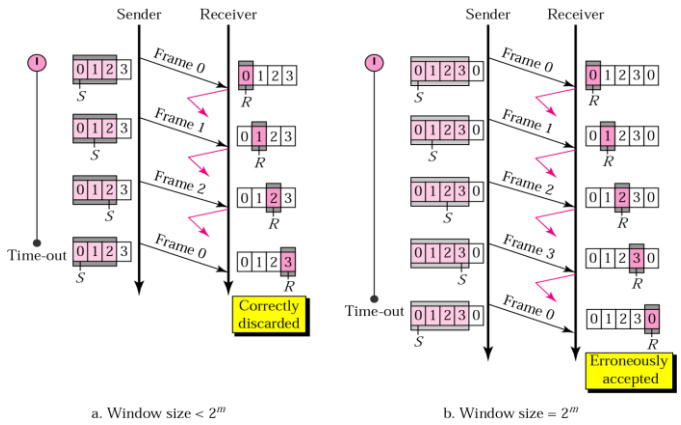
ESO ACADEMY

Find the CRC for the data blocks 100100 with the divisor 1101?

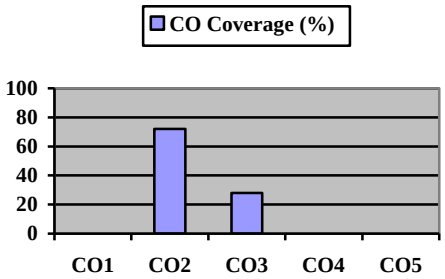


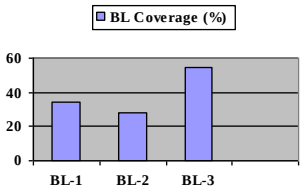


19	**a.** **1. Find the Class, the Block, and the Range of the given network address;** **(1) Network address: 17.0.0.0** **(2) Network Address: 132.21.0.0** **(3) Network Address: 220.34.76.0** **b. Draw the flow diagram to find the class of classful addressing. Explain this for the following address: 10100111 11011011 10001011 01101111** **Ans:** **[Marks: 6 + 6]** <u>Part A:</u> (1) The Class is A because the first byte is between 0 and 127. The block has a netid of 17. The addresses range from 17.0.0.0 to 17.255.255.255. (2) The class is B The block is 132.21 The range is 132.21.0.0 to 132.21.255.255. (3) The class is C The block is 220.34.76 The range of addresses is 220.34.76.0 to 220.34.76.255 <u>Part B:</u>  	**6 + 6**	**3**	**3**	**7**

	Address: 10100111 11011011 10001011 01101111 The first bit is 0; the second bit is 1. This is a class B address.				
20	**In Go-back N protocol, why the size of the sender window must be less than 2^m and explain with neat diagram.** **Ans:** **[Marks: 6 + 6]** Let us consider, m = 2, which means the size of the window can be 2-1, or 3. Figure 11.15 compares a window size of 3 against a window size of 4. If the size of the window is 3 (less than 22) and all three acknowledgments are lost, the frame 0 timer expires and all three frames are resent. The receiver is now expecting frame 3, not frame 0, so the duplicate frame is correctly discarded. On the other hand, if the size of the window is 4 (equal to 22) and all acknowledgments are lost, the sender will send a duplicate of frame 0. However, this time the window of the receiver expects to receive frame 0, so it accepts frame 0, not as a duplicate, but as the first frame in the next cycle. This is an error.  a. Window size < 2^m b. Window size = 2^m	**12**	**3**	**2**	**3**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Course Coordinator

Name of the Student: **Register No.:**

Part- A (10 x 1= 10 Marks)					
Q. No	**CO**	**PO**	**Maximum Marks**	**Marks Obtained**	**Total**
1	CO2	3	1		
2	CO3	3	1		
3	CO2	7	1		
4	CO2	7	1		
5	CO2	7	1		
6	CO2	3	1		
7	CO2	3	1		
8	CO2	7	1		
9	CO3	7	1		
10	CO3	7	1		
Part- B (4 x 4= 16 Marks)					
11	CO2	3	4		
12	CO2	3	4		
13	CO2	3	4		
14	CO2	3	4		
15	CO3	3	4		
16	CO3	3	4		
Part – C (2 X 12 = 24 marks)					
17	CO2	3	12		
18	CO2	3	12		
19	CO3	7	12		
20	CO2	3	12		

CO	Maximum	Marks
2	59	
3	23	
Total	82	

PO	Maximum	Marks
3	64	
7	18	
Total	82	

Signature of the Question paper setter **Academic Advisor**