Date: **Reg.No:**

FRANCIS XAVIER ENGINEERING COLLEGE
(An Autonomous Institution)
Tirunelveli-627003
Department of Computer Science and Engineering
CONTINUOUS ASSESSMENT TEST -I
Month & Year: September & 2022
Year/ Semester: Third Year/ Fifth Semester
Academic Year: 2022-2023/ODD
Course Code/Title: 19CS5602 COMPUTER NETWORKS
(Regulation 2019)

Time: Three hours **Maximum: 100 Marks**

Answer ALL Questions

PART – A (10 x 2 = 20 Marks)

Q.No	Question	Max. Marks	CO-K Level	PO-PI Code
1.	Are Protocols needed for Data Communication? Justify your answer. Yes, Protocols are needed for Data Communication. The purpose of it to facilitate timely and accurate communication between multiple devices with different configurations.	02	CO1- K4	2.2.3
2.	What is the propagation time if the distance between the two points is 12,000 km? Assume the propagation speed to be 2.4×10^8 m/s in cable. $\text{Propagation time} = \frac{12{,}000 \times 1000}{2.4 \times 10^8} = 50 \text{ ms}$	02	CO1- K3	2.1.3
3.	A telephone line normally has a bandwidth of 3000. The signal-to-noise ratio is usually 3162. For this channel, compute the capacity. $C = B \log_2 (1 + \text{SNR}) = 3000 \log_2 (1 + 3162) = 3000 \log_2 3163$ $= 3000 \times 11.62 = 34{,}860 \text{ bps}$	02	CO1- K3	2.1.3
4.	You have two computers connected by an Ethernet hub at home. Is this a LAN, a MAN, or a WAN? Justify your answer.	02	CO1- K3	2.1.3

	Connecting two computers by an Ethernet hub at home is a LAN, because the geographical area spanned by the network would be very small, connects two computers locally.			
5.	Compare and contrast byte-oriented and bit-oriented protocols. Which category has been popular in the past (explain the reason)? Which category is popular now (explain the reason)? The main difference between byte oriented and bit oriented protocols: the main difference between byte oriented and bit oriented is in a byte oriented protocol, data to be carried are 8 bit characters from a coding system such as Ascii. whereas in a bit oriented protocol, the data section of a frame is a sequence of bits to be interpreted by the upper layer as text, graphic, audio, and video and so on. Bit oriented protocols are more popular today because we need to send text, graphic, audio and video which can be better represented by a bit pattern than a sequence of characters/	2	CO2-K4	2.2.3
6.	Define the type of the following destination addresses: a. 4A:30:10:21:1O:1A b. 47:20:1B:2E:08:EE c. FF:FF:FF:FF:FF:FF Solution To find the type of the address, we need to look at the second hexadecimal digit from the left. If it is even, the address is unicast. If it is odd, the address is multicast. If all digits are Fs, the address is broadcast. a. This is a unicast address because A in binary is 1010 (even). b. This is a multicast address because 7 in binary is 0111 (odd). c. This is a broadcast address because all digits are Fs in hexadecimal.	2	CO2-K3	2.2.3
7.	List out the sublayers of DLL and also define the purpose of it. The data link layer is further divided into two sub-layers, which are as follows: • Logical Link Control (LLC): This sublayer of the data link layer deals with multiplexing, the flow of data among applications	2	CO2-K2	2.2.4

<table>
<tr><td></td><td>and other services, and LLC is responsible for providing error messages and acknowledgments as well.
• Media Access Control (MAC):
MAC sublayer manages the device's interaction, responsible for addressing frames, and also controls physical media access.</td><td></td><td></td><td></td></tr>
<tr><td>8.</td><td>What is the purpose of hamming code?
Hamming code is an error correction system that can detect and correct errors when data is stored or transmitted. It requires adding additional parity bits with the data. It is commonly used in error correction code (ECC) RAM.</td><td>2</td><td>CO2-K2</td><td>1.3.1</td></tr>
<tr><td>9.</td><td>What is the difference between connectionless and connection-oriented services? Which type of service is provided by IPv4? Which type of service is provided by IPv6?
<table><tr><th>S.NO</th><th>Connection-oriented Service</th><th>Connection-less Service</th></tr><tr><td>1.</td><td>Connection-oriented service is related to the telephone system.</td><td>Connection-less service is related to the postal system.</td></tr><tr><td>2.</td><td>Connection-oriented service is preferred by long and steady communication.</td><td>Connection-less Service is preferred by bursty communication.</td></tr><tr><td>3.</td><td>Connection-oriented Service is necessary.</td><td>Connection-less Service is not compulsory.</td></tr><tr><td>4.</td><td>Connection-oriented Service is feasible.</td><td>Connection-less Service is not feasible.</td></tr><tr><td>5.</td><td>In connection-oriented Service, Congestion is not possible.</td><td>In connection-less Service, Congestion is possible.</td></tr><tr><td>6.</td><td>Connection-oriented Service gives the guarantee of reliability.</td><td>Connection-less Service does not give a guarantee of reliability.</td></tr><tr><td>7.</td><td>In connection-oriented Service, Packets follow the same route.</td><td>In connection-less Service, Packets do not follow the same route.</td></tr></table>IPv6 is connection-oriented
IPv4 is connection-less</td><td>2</td><td>CO3-K4</td><td>2.2.4</td></tr>
<tr><td>10.</td><td>Change the following IPv4 addresses from binary notation to dotted-decimal notation.
a. 10000001 00001011 00001011 11101111
b. 11000001 10000011 00011011 11111111
Solution
We replace each group of 8 bits with its equivalent decimal number and add dots for separation.</td><td>2</td><td>CO3-K3</td><td>2.2.3</td></tr>
</table>

	a. 129.11.11.239 b. 193.131.27.255			

PART – B (5 x 13 = 65 Marks)

Q.No.	Question	Max. Marks	CO-K Level	PO-PI Code
11 (a)	Illustrate the Layered architecture of OSI model in detail. Dialog control and synchronization are two responsibilities of the session layer in the OSI model. Which layer do you think that it is responsible for these duties in the internet model? - Layered architecture of OSI model – 7 layers(10) - Application layer in internet model (3)	13	CO1- K4	2.2.3
	(Or)			
(b)	Illustrate the architecture of TCP/IP protocol stack in detail. - Protocol diagram (6) - Description of each layer (7)	13	CO1- K2	1.3.1
12 (a)	Compare and contrast the various media used for transmission. - Guided media (7) - Unguided media (6)	[13]	CO1- K4	2.2.4
	(Or)			
(b)	Analyze the working concept of various types of Switching in detail with diagrams. - Circuit switching (4) - Packet switching (5) - Message switching (4)	13	CO1- K2	1.3.1
13(a)	Describe in detail about the general protocol that can be used for only point-to-point configuration. - PPP framing (5)	13	CO2-K2	1.3.1

	- Transition phases (5) - Multiplexing (3)			
	(Or)			
(b)	Among the standards IEEE 802.3 and IEEE 802.11, which one can be referred as Wireless Fidelity? Also explain its architecture. - IEEE 802.11 ➔ BSS and ESS (5) ➔ Station types (4) ➔ MAC sublayers-DCF,PCF (4)	13	CO2-K4	2.2.4
14a)	List the deficiencies of IPv4. Describe how to overcome it. - Deficiencies of IPv4 (5) - IPv6 (8)	13	CO3-K2	1.3.1
	(Or)			
(b)	Explain the datagram format of IPv4. - Diagram (7) - Description (8)	13	CO3-K2	1.3.1
15 (a)	An organization is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets. a. Find the subnet mask. b. Find the number of addresses in each subnet. c. Find the first and last addresses in subnet 1. d. Find the first and last addresses in subnet 32	13	CO3-K4	2.2.3

	1. Find the subnet mask. **Number of extra 1s** = $log_2 32 = 5$ **Subnet Mask:** /29 (24 + 5) 2. Find the number of address in each subnet **Number of addresses** = $2^{32-29} = 2^3 = 8$ addresses per subnet 3. Find the first and last address in subnet 1 c. **Subnet 1:** The first address is the beginning address of the block or **211.17.180.0**. To find the last address, we need to write 7 (one less than the number of addresses in each subnet) in base 256 (0.0.0.7) and add it to the first address (in base 256). **First address in subnet 1:** 211 . 17 . 180 . 0 **Number of addresses:** 0 . 0 . 0 . 7 **Last address in subnet 1:** 211 . 17 . 180 . 7 - a(3), b(3), c(4), d(3)			
	(Or)			
(b)	An IPv4 datagram has arrived with the following information **in** the header (in hexadecimal): Ox45 00 00 54 00 03 58 50 20 06 00 00 7C 4E 03 02 B4 OE OF 02 a. Is the packet corrupted? b. Are there any options? c. Is the packet fragmented? d. What is the size of the data? e. How many more routers can the packet travel to? f. What is the identification number of the packet? g. What is the type of service?	15	CO3-K4	2.2.3

	Ans: a. Since HLEN is 5, there is no option b. The packet is not fragmented because the offset value is 0 and the flags value is 0 c. The size of the data is 54 – 20 = 34 bytes d. No checksum is used e. The packet can travel to 20 more routers f. The identification number of this packet is 0003 g. The type of service is normal (0) Ver: 4 | HLN: 5 | DS: 00 | Total Length:0054 Identification :0003 | Flags :00 | Offset :00 TTL : 20 | Protocol :06 | Header Check Sum: 0000 Source IP: 7C4E0302 Destination IP: B40E0F02 Source Address: 0x7C4E0302 = 124.78.3.2 Destination Address: 0xB40E0F02 = 180.14.15.2			

PART – C (1 x 15 = 15 marks)

Q.No.	Question	Max. Marks	CO-K Level	PO-PI Code
16 (a)	Suppose we want to transmission the message 1011 0010 0111 and protect it from errors using the CRC polynomial X^4+X^2+1. Use polynomial long division to determine the message that should be transmitted. Suppose the leftmost bit of 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? - Message (8) - Receiver's CRC calculation, error (7)	15	CO2-K3	2.2.4
	(Or)			
(b)	(i) Assuming even parity, find the parity bit for each of the following data units. a. 1001011 b. 0001100 c. 1000000 d. 1110111 - 4*1=4 (ii) Analyze "Bluetooth used for Short range communication or long range communication".	4+11	CO2-K4	2.2.3

	- Short range (2) - Piconet (7) - Scatternet (6)			

Bloom's Taxonomy Level wise Marks and Course Outcome wise Marks Distribution Analysis:

Competence level	Blooms' Taxonomy	Question No.	Marks	BTL Contribution in %	Course Outcome	Marks	CO Contribution in %
K1	Remember				CO1	60	33.3
K2	Understand	**7,8,11b,12b,13a, 14a,14b**	**69**	**38.3**	CO2	64	35.6
K3	Apply	**2,3,4,6,10,16a**	**25**	**13.9**	CO3	56	31.1
K4	Analyse	**1,5,9,11a,12a,13b,15a,15b,16b**	**86**	**47.8**	CO4		
K5	Evaluate				CO5		
K6	Create						
Total			**180**	**100**		**180**	**100**