SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

SET-A

Academic Year: EVEN-2022-23

Test: CLA-T2 **Date: 30/03/2023**
Course Code & Title: 18CSS202J-Computer Communications **Duration: 2 Hours**
Year & Sem: II Yr / IV Sem **Max. Marks: 50**

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	3
CO2	3	2	3	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3
CO4	3	2	-	-	-	-	-	-	-	-	-	3
CO5	3	-	-	-	-	-	-	-	-	-	-	3
CO6	3	3	3	-	-	-	-	-	-	-	-	3

Part – A (10 x 1 = 10 Marks)

Instructions: 1) Answer ALL questions. 2) The duration for answering the part A is 15 minutes (this sheet will be collected after 20 minutes). 3) Encircle the correct answer (if more than one is right answer encircle appropriately)

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Find the Range of Class A address a) 0.0.0.0 to 192.0.0.0 b) 0. 0. 0. 0 to 233.255.255.255 **c) 0.0.0.0 to 127.255.255.255** d) 127.255.255.255 to 0 .0 .0 .127	1	1	3	1	1.6.1
2	Change the following IPv4 addresses from dotted-decimal notation to binary notation. 111.56.45.78. a) 11101111 00111100 10101101 01101110 b) 01101111 00111111 00101101 01001110 c) 01101111 00111000 00111101 01001111 d) **01101111 00111000 00101101 01001110**	1	2	3	2	2.6.3
3	Find the error, if any, in the following IPv4 addresses. i) 111.56.045.78 ii) 221.34.7.8.20 iii) 75.45.301.14 iv) 11100010.23.14.67 a) **All the 4 cases are errors** b) i ,ii and iii error c) ii , iii, iv error d) all the 4 correct	1	2	3	2	2.6.3
4	In a class B, network on the internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts per subnet? a) 4096 b) **4094**	1	2	3	2	2.6.3

	c) 4092 d) 4090					
5	Which networking device connect one LAN to other LAN using same protocol? a) Router b) Switch **c) Bridge** d) Modem	**1**	**2**	**2**	**1**	**1.6.1**
6	In Frequency Division Multiple Access (FDMA), each band is reserved for a specific a) Signal **b) Station** c) Bandwidth d) Data	**1**	**1**	**2**	**1**	**1.6.1**
7	Ethernet uses _____encoding a) bipolar b) unipolar c) differential manchester **d) manchester**	**1**	**1**	**2**	**1**	**1.6.1**
8	In _____ the amplitude of the carrier signal is varied based on the information in a digital signal. a) PSK **b) ASK** c) BSK d) FSK	**1**	**2**	**2**	**1**	**1.6.1**
9	In analog transmission of digital data, the signal or baud rate is _____ the bit rate. a) greater than b) lesser than **c) lesser than or equal to** d) greater than or equal to	**1**	**2**	**2**	**1**	**1.6.1**
10	The minimum bandwidth requirement of QAM is a) B=S b) **B=(1+d) S** c) B=(1-d)S d) B=dS	**1**	**2**	**2**	**1**	**1.6.1**

Part – B (5 x 2 Marks =10 Marks)						
11	A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first address and Last address in the block? **Ans :** The binary representation of the given address is **11001101 00010000 00100101 00100111** If we set 32−28 rightmost bits to 0, we get 11001101 00010000 00100101 0010000 or 205.16.37.16 is First Address. The binary representation of the given address is **11001101 00010000 00100101 00100111**. If we set 32 - 28 rightmost bits to 1, we get 11001101 00010000 001001010010 1111 or 205.16.37.47 is Last Address.	**2**	**3**	**3**	**2**	**2.6.3**
12	Explain why most of the addresses in class A are wasted. Explain why a medium-size or large-size corporation does not want a block of class C addresses. **Ans**: A class A subnet has 24 bits worth of addressing, which is enough for almost 17 million individual devices. Most entities have only a small fraction of this number of devices, so most of the addresses are not used.	**2**	**2**	**3**	**2**	**2.6.3**
13	Find the net id and the broadcast id of the following IP addresses. i. 114.34.2.8 – a) Class is A⇒netid: 114 and hostid: 34.2.8 i. 132.56.8.6– Class is B⇒netid: 132.56 and hostid: 8.6	**2**	**3**	**3**	**2**	**2.6.3**
14	Define bit rate, baud rate and formulate its relationship equation. **Bit rate, N**, is the number of bits per second (bps). Also called as ***Data Rate*** **Baud rate, S** is the number of signal elements per second (bauds). Also called as ***Signal Rate*** • The relationship between them is **S=Nx1/r bauds** Where S - Signal rate *N - data rate* r - number of data bits per signal element. In the analog transmission of digital data, the signal or baud rate is less than or equal to the bit rate.	**2**	**2**	**2**	**1**	**1.6.1**
15	Assume a voltage signal with amplitudes V_{min}=-40V and V_{max}=+40V. Assuming 8 quantization levels. Compute the zone width and quantization levels. Zone width ⊗ = (40 - -40)/8 = 10 The 8 zones are: -40 to -30, -30 to -20, -20 to -10, -10 to 0, 0 to 10, 10 to 20, 20 to 30, 30 to 40 The midpoints are: --35, -25, -15, -5, 5, 15, 25, 35	**2**	**3**	**2**	**2**	**2.6.3**

Part – C (2 x 15 Marks =30 Marks)						
16)a)	Find the first address, the last address, and the number of addresses to represent the mask as a 32-bit binary (or 8-digit hexadecimal) number. This is particularly useful when we are writing a program to find these pieces of information. In Example IP Address with the /28 can be represented as 11111111 11111111 11111111 11110000 (twenty-eight 1's and four O's). Find i.The first address (5 Marks) i.The last address (5 Marks) i.The number of addresses (5 Marks) 1) **Solution** a. **The first address** can be found by ANDing the given addresses with the mask. ANDing here is done bit by bit. The result of ANDing 2 bits is 1 if both bits are Is; the result is 0 otherwise. Address: 11001101 00010000 00100101 00100111 Mask: 11111111 11111111 11111111 11110000 First address: 11001101 00010000 00100101 00100000 b. **The last address** can be found by ORing the given addresses with the complement of the mask. ORing here is done bit by bit. The result of ORing 2 bits is 0 if both bits are Os; the result is 1 otherwise. The complement of a number is found by changing each 1 to 0 and each 0 to 1. Address: 11001101 00010000 00100101 00100111 Mask complement: 00000000 00000000 00000000 00001111 Last address: 11001101 00010000 00100101 00101111 **c. The number of addresses** can be found by complementing the mask, interpreting it as a decimal number, and adding 1 to it. Mask complement: 000000000 00000000 00000000 00001111 Number of addresses: 15 + 1 = 16	**15**	**4**	**3**	**3**	**3.2.1**
(OR)						
16)b)	Suppose a big single network having IP Address 200.1.2.0. We want to do subnetting and divide this network into 4 subnets. i.Find the number of hosts per subnet and subnet Address (3 Marks) i.First Host ID (4 Marks) i.Last Host ID (4 Marks) v.Broadcast Address (4 Marks) Clearly, the given network belongs to class C.	**15**	**4**	**3**	**3**	**3.2.1**

For creating four subnets and to represent their subnet IDs, we require 2 bits.

So,

- We borrow two bits from the Host ID part.
- After borrowing two bits, Host ID part remains with only 6 bits.

If borrowed bits = 00, then it represents the 1st subnet.

- If borrowed bits = 01, then it represents the 2nd subnet.
- If borrowed bits = 10, then it represents the 3rd subnet.
- If borrowed bits = 11, then it represents the 4th subnet.

IP Address of the four subnets are-

- 200.1.2.**00**000000 = 200.1.2.0
- 200.1.2.**01**000000 = 200.1.2.64
- 200.1.2.**10**000000 = 200.1.2.128
- 200.1.2.**11**000000 = 200.1.2.192

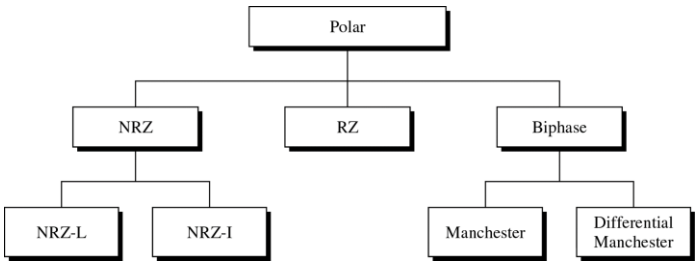
For 1st Subnet-

- IP Address of the subnet = 200.1.2.0
- Total number of IP Addresses = $2^6 = 64$
- Total number of hosts that can be configured = 64 – 2 = 62
- Range of IP Addresses = [200.1.2.**00**000000, 200.1.2.**00**111111] = [200.1.2.0, 200.1.2.63]
- Direct Broadcast Address = 200.1.2.**00**111111 = 200.1.2.63
- Limited Broadcast Address = 255.255.255.255

For 2nd Subnet-

IP Address of the subnet = 200.1.2.64

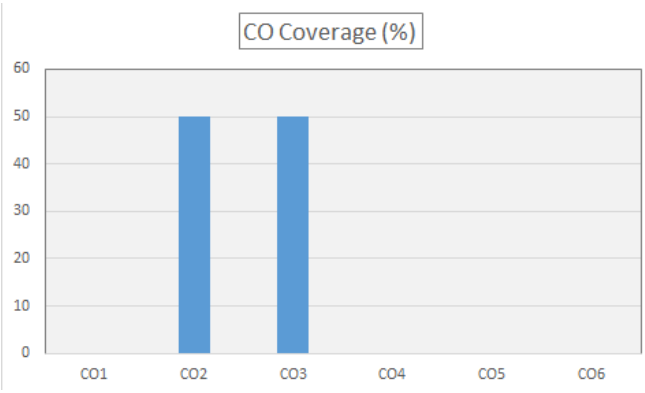
- Total number of IP Addresses = $2^6 = 64$
- Total number of hosts that can be configured = 64 – 2 = 62
- Range of IP Addresses = [200.1.2.**01**000000, 200.1.2.**01**111111] = [200.1.2.64, 200.1.2.127]

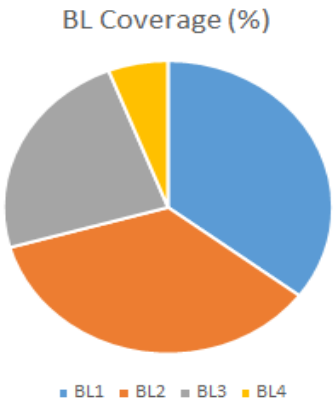
	● Direct Broadcast Address = 200.1.2.**01**111111 = 200.1.2.127 ● Limited Broadcast Address = 255.255.255.255 **For 3rd Subnet-** IP Address of the subnet = 200.1.2.128 ● Total number of IP Addresses = 2^6 = 64 ● Total number of hosts that can be configured = 64 – 2 = 62 ● Range of IP Addresses = [200.1.2.**10**000000, 200.1.2.**10**111111] = [200.1.2.128, 200.1.2.191] ● Direct Broadcast Address = 200.1.2.**10**111111 = 200.1.2.191 ● Limited Broadcast Address = 255.255.255.255 **For 4th Subnet-** IP Address of the subnet = 200.1.2.192 ● Total number of IP Addresses = 2^6 = 64 ● Total number of hosts that can be configured = 64 – 2 = 62 ● Range of IP Addresses = [200.1.2.**11**000000, 200.1.2.**11**111111] = [200.1.2.192, 200.1.2.255] ● Direct Broadcast Address = 200.1.2.**11**111111 = 200.1.2.255 ● Limited Broadcast Address = 255.255.255.255					
17a)	I. Categorize the polar line encoding schemes. (3 Marks)  II. For the data sequence 1011001101, illustrate various polar line encoding schemes. (12 Marks) Polar NRZ L, NRZ I – 5 marks Polar RZ – 2 Marks Polar Biphase, Manchester and Differential Manchester – 5 marks	**15**	**4**	**2**	**2**	**2.6.3**
	(OR)					

17b)	I. Compare different digital modulation techniques with examples. (10 Marks) Comparison of ASK, FSK, PSK, QPSK and QAM can be given in terms of modulation waveform, modulation block diagram, bandwidth, advantages/disadvantages, applications (5 marks) Example for different modulation techniques with a data sequence (5 marks) II. Classify the different categories of WDM with examples. (5 Marks) **Course WDM (CWDM)**: CWDM generally operates with 8 channels where the spacing between the channels is 20 nm (nanometers) apart. It consumes less energy than DWDM and is less expensive. However, the capacity of the links, as well as the distance supported, is lesser. **Dense WDM (DWDM)** : In DWDM, the number of multiplexed channels much larger than CWDM. It is either 40 at 100GHz spacing or 80 with 50GHz spacing. Due to this, they can transmit the huge quantity of data through a single fiber link. DWDM is generally applied in core networks of telecommunications and cable networks. It is also used in cloud data centers for their IaaS services. Dense wavelength division multiplexing is often called just wavelength division multiplexing. Dense wavelength division multiplexing multiplexes multiple data streams onto a single fiber optic line. Different wavelength lasers (called lambdas) transmit the multiple signals. Each signal carried on the fiber can be transmitted at a different rate from the other signals. Dense wavelength division multiplexing combines many (30, 40, 50, 60, more?) onto one fiber.	**15**	**4**	**2**	**2**	**2.6.4**

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

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





Approved by the Audit Professor/Course Coordinator