Register Number															

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

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

Academic Year: 2021-22 (Even)

Set - B

Test: CLA-T2 | Date: 30-05-2022
Course Code & Title: 18CSS202J - Computer Communications | Duration: 100 Minutes (2 Periods)
Year & Sem: II Year / IV Sem | Max. Marks: 50

Course Articulation Matrix:

S.No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	CO1	3	-	-	-	-	-	-	-	-	-	-	3
2	CO2	3	2	3	-	-	-	-	-	-	-	-	3
3	CO3	3	3	3	-	-	-	-	-	-	-	-	3
4	CO4	3	2	-	-	-	-	-	-	-	-	-	3
5	CO5	3	-	-	-	-	-	-	-	-	-	-	2
6	CO6	3	3	3	-	-	-	-	-	-	-	-	3

Part - A
(20 x 1 = 20 Marks)

Instructions: 1) Answer ALL questions. 2) The duration for answering the part A is 30 minutes (this sheet will be collected after 30 minutes). 3) Encircle the correct answer 4) * denotes more than one choice may be correct

Q. No	Question	Marks	BL	CO	PO	PI Code
1	In IPV4 address, Class B uses _____ bits for net ID and _____ bits for host ID a) 8, 24 **b) 16, 16** c) 15, 17 d) 24, 8	1	1	3	1	1.7.1
2	How many possible networks are there in a class C of an IPv4 address? a) 16384 b) 128 c) 256 **d) 2097152**	1	1	3	2	2.6.3
3	Choose the dotted-decimal notation of the IPv4 address 01100011 01111101 10101100 11010010 a) 100.126.173.211 b) 98.124.171.209 **c) 99.125.172.210** d) 99.124.172.209	1	2	3	2	2.6.3
4	Choose the class of the given IPV4 address 248.48.24.155 a) B b) A **c) E** d) D	1	1	3	1	1.7.1
5	What is the first address in the block of one of the addresses 168.122.98.123/26 a) 168.122.98.127 b) 168.122.98.0 c) 168.122.98.1 **d) 168.122.98.64**	1	2	3	2	2.6.3
6	Assume that an organization is assigned with Class C network ID. The organization wants to have 12 subnets. Which subnet mask it will use. a) 255.255.255.252 **b) 255.255.255.240** c) 255.255.255.192 d) 255.255.255.248	1	2	3	2	2.6.3

7	Dividing a large address block into smaller sub-groups is _____. a) Supermasking b) Submasking c) Supernetting **d) Subnetting**	1	2	3	1	1.7.1
8	Repeater operates at layer (s) _____of the OSI model. **a) Physical Layer** b) Data link Layer c) Network Layer d) Presentation Layer	1	2	3	1	1.7.1
9 *	Choose the correct statement(s) about router. **a) It transfers the data in the form of packets** b) It sends data based on the MAC address of a device. **c) It uses a routing table to send the data** d) It has only one port to connect the device.	1	1	3	1	1.7.1
10	Number of addresses in a block must be a power of 2 is one of the restrictions in _____. **a) Classless Addressing** b) Classful Addressing c) Private Address d) Public Address	1	2	3	1	1.7.1
11	Pulse Code Modulation is the process of converting _____. a) digital data to digital signals b) analog data to digital signals c) digital data to analog signals **d) analog signal to digital data**	1	1	4	1	1.7.1
12	A receiver will evaluate the average power of the received signal called _____ and use that to determine the value of the incoming data elements. a) DC components b) Synchronization **c) Baseline** d) Noise	1	1	4	1	1.7.1
13	The unit for signal rate is _____. a) bps **b) baud** c) immune d) Coulomb	1	1	4	1	1.7.1
14	In Frequency Shift Keying, the _____ and _____ remain constant for all signal elements. **a) peak amplitude, phase** b) frequency, phase c) voltage, frequency d) signal element, data element	1	2	4	1	1.7.1
15	Calculate the value of the signal rate for the case “One data element per two signal elements” if the data rate is 1 Mbps and c = 1/2. a) 500 Kbaud **b) 1 Mbaud** c) 250 Kbaud d) 375 Kbaud	1	3	4	2	2.6.3
16	The _____ separates a signal into its component signals ie. one input and n outputs. a) Mux **b) Demux** c) Encoder d) Decoder	1	1	4	1	1.7.1
17	_____ uses a carrier signal at a discrete frequency for each data stream and then combines many modulated signals. a) TDM b) SDM c) CDMA **d) FDM**	1	1	4	1	1.7.1
18	Multiplexing is used in? a) Packet switching **b) Circuit switching** c) Data switching d) Packet & Data switching	1	2	4	1	1.7.1
19	The Polar Non-Return to Zero scheme uses _____ voltage values. a) 1 **b) 2** c) 3 d) 4	1	1	4	1	1.7.1
20	What is Synchronous TDM? **a) gives same amount of time to each device** b) gives same amount of frequency to each device c) gives variable time to each device d) gives variable frequency to each device	1	3	4	1	1.7.1

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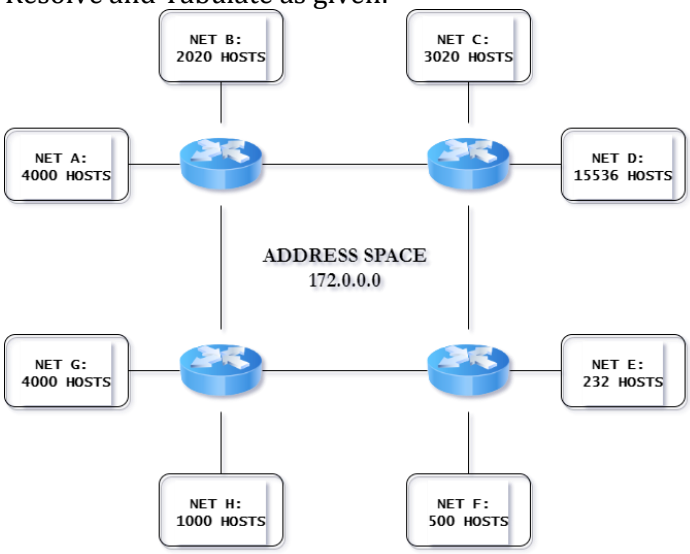
Course Code & Title: 18CSS202J - Computer Communications | Duration: 100 Minutes (2 Periods)
Year & Sem: II Year / IV Sem | Max. Marks: 50

Part – B
(2 x 5 = 10 Marks)
Instructions: Answer ALL questions

Q. No	Question	Marks	BL	CO	PO	PI Code
21	i. Identify the network Id for the IP address 122.10.45.200/20 ii. If 64 subnets are needed for 172.16.0.0 address space, what subnet mask must be assigned? iii. To have a real point to point network without a network and broadcast address, how many network bits are required in an IP address? iv. At least, how many network bits are used when the IP addresses 192.168.10.127 and 192.168.10.128 belong to different subnets? v. What is the wildcard mask for 255.255.128.0 **Answer:** i. 122.10.32.0/20 ii. 255.255.252.0 iii. 31 iv. 25 v. 0.0.127.255	5	3	3	2	2.6.3
22	Distinguish between a signal element and a data element **Answer:** ✓ A data element is the smallest entity that can represent a piece of information (a bit). ✓ A signal element is the shortest unit of a digital signal. ✓ Data elements are what we need to send; signal elements are what we can send. ✓ Data elements are being carried; signal elements are the carriers. ✓ We define a ratio r which is the number of data elements carried by each signal element.	5	2	4	1	1.7.1

Part – C
(2 x 10 = 20 Marks)
Instructions: Answer ANY two questions

Q. No	Question	Marks	BL	CO	PO	PI Code

23. A	Resolve and Tabulate as given:  					10	3	3	2	2.6.3

Network	Hosts	Net ID in CIDR notation	Subnet Mask	Number of Hosts in Subnet	Broadcast Address
NET A					
NET B					
NET C					
NET D					
NET E					
NET F					
NET G					
NET H					

Answer:

Network	Hosts	Net ID in CIDR notation	Subnet Mask	Number of Hosts in Subnet	Broadcast Address
NET D	15536	172.0.0.0/18	255.255.192.0	16382	172.0.63.255
NET A	4000	172.0.64.0/20	255.255.240.0	4094	172.0.79.255
NET G	4000	172.0.80.0/20	255.255.240.0	4094	172.0.95.255
NET C	3020	172.0.96.0/20	255.255.240.0	4094	172.0.111.255
NET B	2020	172.0.112.0/21	255.255.248.0	2046	172..0.119.255
NET H	1000	172.0.120.0/22	255.255.252.0	1022	172.0.123.255
NET F	500	172.0.124.0/23	255.255.254.0	510	172.0.125.255
NET E	232	172.0.126.0/24	255.255.255.0	254	172.0.126.255

Or

<table>
<tr>
<td>23. B</td>
<td>An organization is granted a block of 192.168.10.0. The administrator wants to create 11 subnets as shown below.
1. 2 subnets with 64 addresses
2. 2 subnets with 32 addresses
3. 3 subnets with 16 addresses
4. 4 subnets with 4 addresses

Find the subnet mask, usable address range, network address, and broadcast address for each subnet. (7)
If no subnetting is done and when Class C address is used for each network for the above demands, tabulate how many address spaces are wasted for each network. (3)

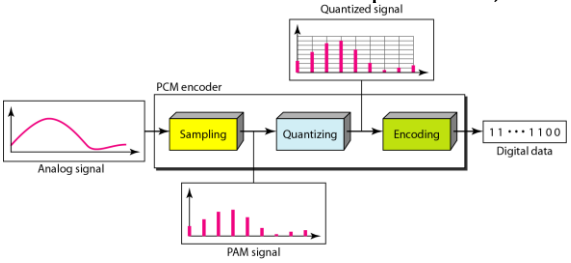
Answer:

2 subnets with 64 addresses:
192.168.10.0/26 and 192.168.10.64/26

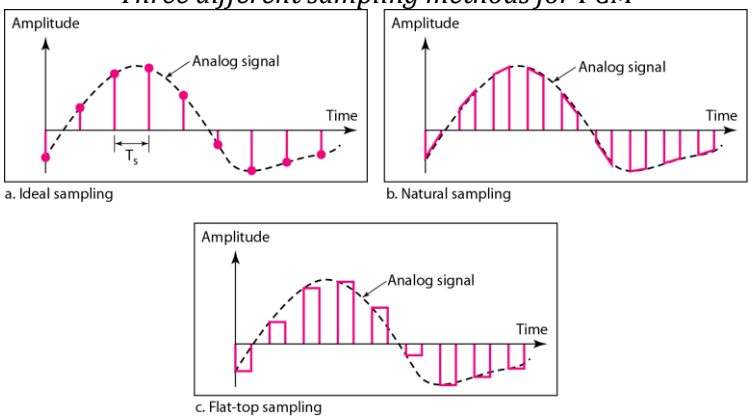
2 subnets with 32 addresses:
192.168.10.128/27 and 192.168.10.160/27

3 subnets with 16 addresses:
192.168.10.192/28 and 192.168.10.208/28,
192.168.10.224/28

4 subnets with 4 addresses:
192.168.10.240/30, 192.168.10.244/30,
192.168.10.248/30 and 192.168.10.252/30

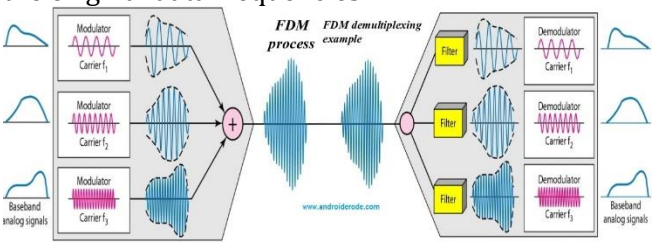
Wasted Addresses:
<table>
<tr><th>Network</th><th>Required Hosts</th><th>Wasted Address</th></tr>
<tr><td>Subnet 1</td><td>64</td><td>192 addresses</td></tr>
<tr><td>Subnet 2</td><td>64</td><td>192 addresses</td></tr>
<tr><td>Subnet 3</td><td>32</td><td>224 addresses</td></tr>
<tr><td>Subnet 4</td><td>32</td><td>224 addresses</td></tr>
<tr><td>Subnet 5</td><td>16</td><td>240 addresses</td></tr>
<tr><td>Subnet 6</td><td>16</td><td>240 addresses</td></tr>
<tr><td>Subnet 7</td><td>16</td><td>240 addresses</td></tr>
<tr><td>Subnet 8</td><td>4</td><td>252 addresses</td></tr>
<tr><td>Subnet 9</td><td>4</td><td>252 addresses</td></tr>
<tr><td>Subnet 10</td><td>4</td><td>252 addresses</td></tr>
<tr><td>Subnet 11</td><td>4</td><td>252 addresses</td></tr>
</table>
</td>
<td>10</td><td>3</td><td>3</td><td>2</td><td>2.6.3</td>
</tr>
<tr>
<td>24. A</td>
<td>Explain Pulse Code Modulation in detail with diagram.
Answer:
✓ The most common technique to change an analog signal to digital data (digitization) is called pulse code modulation (PCM).
✓ A PCM encoder has three processes, as shown in below
 

1) The analog signal is sampled.</td>
<td>10</td><td>2</td><td>4</td><td>1</td><td>1.7.1</td>
</tr>
</table>

	2) The sampled signal is quantized. 3) The quantized values are encoded as streams of bits. *Sampling* ✓ The first step in PCM is sampling ✓ Analog signal is sampled every TS secs. ✓ Ts is referred to as the sampling interval. ✓ fs = 1/Ts is called the sampling rate or sampling frequency. ✓ There are 3 sampling methods: ✓ Ideal - an impulse at each sampling instant ✓ Natural - a pulse of short width with varying amplitude ✓ Flattop - sample and hold, like natural but with single amplitude value ✓ The process is referred to as pulse amplitude modulation PAM and the outcome is a signal with analog (non integer) values *Three different sampling methods for PCM*  *Quantization* ✓ Sampling results in a series of pulses of varying amplitude values ranging between two limits: a min and a max. ✓ The amplitude values are infinite between the two limits. ✓ We need to map the infinite amplitude values onto a finite set of known values. ✓ This is achieved by dividing the distance between min and max into L zones, each of height Δ Δ = (max - min)/L ✓ The midpoint of each zone is assigned a value from 0 to L-1 (resulting in L values) ✓ Each sample falling in a zone is then approximated to the value of the midpoint *Encoding* ✓ The last step in PCM is encoding. After each sample is quantized and the number of bits per sample is decided, each sample can be changed to an 1 bit code word					
	Or					
24. B	Describe the working of Frequency division multiplexing with relevant diagram. Also write its merits, demerits and applications. **Answer:** ✓ Frequency-division multiplexing (FDM) is an analog technique that can be applied when the bandwidth of a	10	2	4	1	1.7.1

link (in hertz) is greater than the combined bandwidths of the signals to be transmitted.

- ✓ In FOM, signals generated by each sending device modulate different carrier frequencies. These modulated signals are then combined into a single composite signal that can be transported by the link.
- ✓ Carrier frequencies are separated by sufficient bandwidth to accommodate the modulated signal.
- ✓ These bandwidth ranges are the channels through which the various signals travel.
- ✓ Channels can be separated by strips of unused bandwidth-guard bands-to prevent signals from overlapping.
- ✓ In addition, carrier frequencies must not interfere with the original data frequencies.



Multiplexing Process

- ✓ Above figure is a conceptual illustration of the multiplexing process.
- ✓ Each source generates a signal of a similar frequency range.
- ✓ Inside the multiplexer, these similar signals modulate different carrier frequencies (f1, f2 and f3).
- ✓ The resulting modulated signals are then combined into a single composite signal that is sent out over a media link that has enough bandwidth to accommodate it.

Demultiplexing Process

- ✓ The demultiplexer uses a series of filters to decompose the multiplexed signal into its constituent component signals.
- ✓ The individual signals are then passed to a demodulator that separates them from their carriers and passes them to the output lines

Merits of FDM:

- ✓ FDM is used for analog signals.
- ✓ FDM process is very simple and easy modulation.
- ✓ A Large number of signals can be sent through an FDM simultaneously.
- ✓ It does not require any synchronization between sender and receiver.

Demerits of FDM:

- ✓ FDM technique is used only when low-speed channels are required.
- ✓ It suffers the problem of crosstalk.
- ✓ A Large number of modulators are required.
- ✓ It requires a high bandwidth channel.

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