

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 |

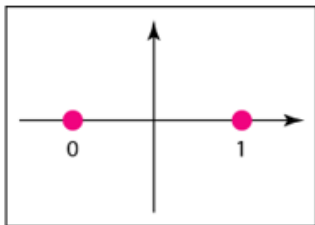
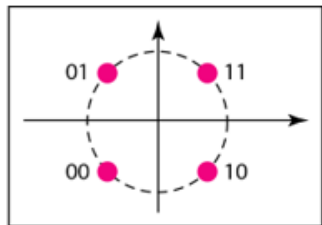
Part – A (10 x 1 = 10 Marks)

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 | What is the broadcast address of the subnet that contains the IP address 192.168.1.50/27? a) 192.168.1.31 b) 192.168.1.47 c) 192.168.1.63 d) 192.168.1.79 | 1 | 2 | 3 | 2 | 2.6.3 |
| 2 | How many host addresses are available in the subnet 192.168.1.0/30? a) 2 b) 4 c) 6 d) 8 | 1 | 1 | 3 | 2 | 2.6.3 |
| 3 | What is the purpose of the private IP addresses? a) To provide IP addresses for hosts on the Internet b) To provide IP addresses for hosts on internal networks c) To provide IP addresses for servers on the Internet d) To provide IP addresses for routers on the Internet | 1 | 1 | 3 | 1 | 1.6.1 |

| | | | | | | |
|----|--|---|---|---|---|-------|
| 4 | What is the purpose of the IP address 127.0.0.1? a) To represent the default gateway b) To represent a broadcast message to all nodes on a network c) To represent the loopback address d) To represent a valid IP address for a host on the Internet | 1 | 2 | 3 | 1 | 1.6.1 |
| 5 | What is the purpose of using subnetting in a network? a) To increase the number of hosts in a network b) To reduce the number of hosts in a network c) To divide a large network into smaller subnetworks d) To combine multiple smaller networks into a larger network | 1 | 1 | 2 | 1 | 1.6.1 |
| 6 | CWDM generally operates with _____ channels a) 16 b) 24 c) 8 d) 6 | 1 | 1 | 2 | 1 | 1.6.1 |
| 7 | ASK modulation is also called as a) Alternate shift keying b) Off keying c) On/Off keying d) Quadrature amplitude modulation | 1 | 1 | 2 | 1 | 1.6.1 |
| 8 | Which of the following is not an advantage of time division multiplexing? a) Signal interference is less b) More flexible c) Full channel can be used for every signal d) Fast data transfer | 1 | 2 | 2 | 1 | 1.6.1 |
| 9 | In PSK which characteristic varies in carrier signal according to source data. a) Frequency b) Phase c) Amplitude d) Phase and frequency | 1 | 2 | 2 | 1 | 1.6.1 |
| 10 | _____ substitutes eight consecutive zeros with 000VB0VB. a) B4B8 b) B8ZS c) HDB3 d) HDB8 | 1 | 1 | 2 | 1 | 1.6.1 |

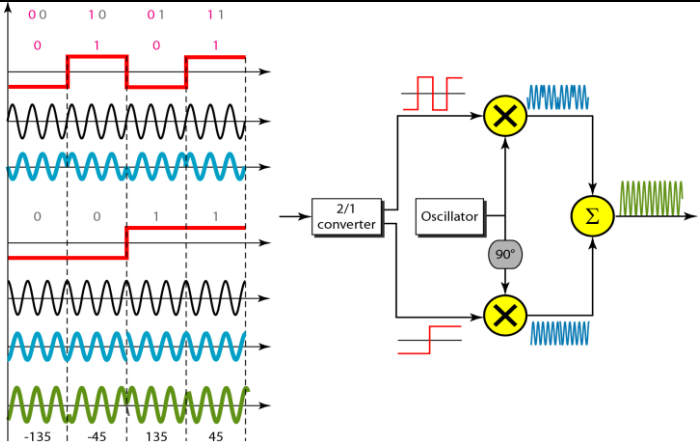
Part – B (5 x 2 Marks =10 Marks)

| | | | | | | |
|----|--|---|---|---|---|-------|
| 11 | <p>What is the broadcast address of the subnet that contains the IP address 192.168.1.50/27?</p> <p>Sub1 :Network: 192.168.1.0/27 11000000.10101000.00000001.000 00000 (Class C) Broadcast: 192.168.1.31</p> <p>Sub 2:Network: 192.168.1.32/27 11000000.10101000.00000001.001 00000 (Class C) Broadcast: 192.168.1.63</p> <p>Sub 3:Network: 192.168.1.64/27 11000000.10101000.00000001.010 00000 (Class C) Broadcast: 192.168.1.95</p> <p>Sub 4:Network: 192.168.1.96/27 11000000.10101000.00000001.011 00000 (Class C) Broadcast: 192.168.1.127</p> | 2 | 3 | 3 | 2 | 2.6.3 |
| 12 | <p>A company has been assigned the network address 192.168.1.0/24. The company wants to create a subnet with 64 host addresses and another subnet with 128 host addresses. Which subnet mask should the company use for the subnet with 128 host addresses?</p> <p>Subnet mask=255.255.255.128 or /25</p> | 2 | 2 | 3 | 2 | 2.6.3 |
| 13 | <p>Illustrate the need for Network Address Translator.</p> <ul style="list-style-type: none"> •A technology that can provide the mapping between the private and universal addresses, and at the same time support virtual private networks. •Allows a site to use a set of private addresses for internal communication and a set of global Internet addresses (atleast one) for communication with the rest of the world. | 2 | 3 | 2 | 1 | 1.6.1 |
| 14 | <p>A system is using NRZ-I to transfer 20-Mbps data. What are the average signal rate and minimum bandwidth?</p> <p>The average signal rate is $S = N / 2 = 10$ Mbaud. The minimum bandwidth for this average baud rate is $B_{min} = S = 10$ MHz.</p> | 2 | 3 | 2 | 2 | 2.6.3 |
| 15 | <p>Illustrate constellation diagram of BPSK and QPSK.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>b. BPSK</p> </div> <div style="text-align: center;">  <p>c. QPSK</p> </div> </div> | 2 | 3 | 2 | 2 | 2.6.3 |

Part – C (2 x 15 Marks =30 Marks)

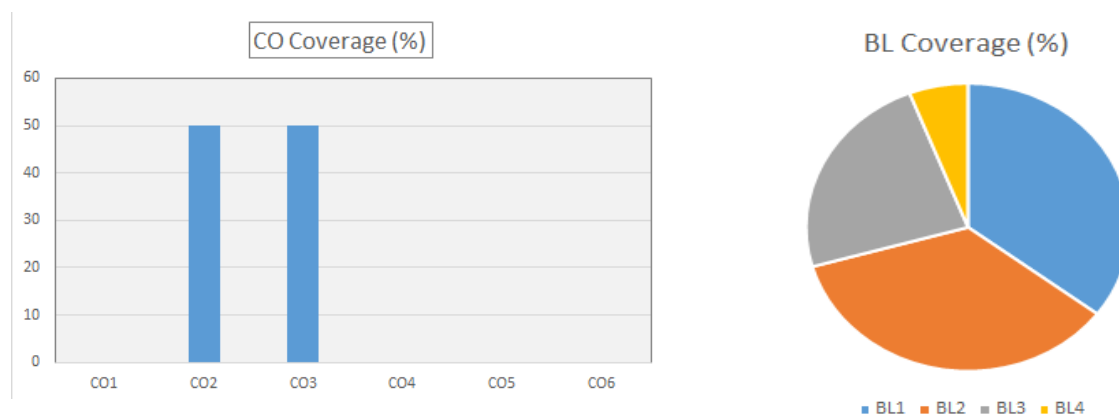
| | | | | | | |
|-------|---|----|---|---|---|-------|
| 16)a) | <p>Create 30 subnets for Class C IP Address 205.11.2.0</p> <p>i. What is the subnet mask for the maximum number of hosts? (5 marks)</p> <p>ii. How many hosts can each subnet have? (5 marks)</p> <p>iii. What is the IP address of host 3 on subnet 2? (5marks)</p> <p>To create 30 subnets for Class C IP address 205.11.2.0, we need to borrow some bits from the host portion of the address to create the subnet portion. The number of bits we need to borrow depends on how many subnets we want to create.</p> <p>To create 30 subnets, we need to borrow 5 bits, since $2^5 = 32$, which is greater than 30. This leaves us with 3 bits for the host portion of the address.</p> <p>To determine the subnet mask for the maximum number of hosts, we need to count the number of bits in the host portion of the address and subtract that from the total number of bits in the address (which is 32 for a Class C address). In this case, we have 3 bits for the host portion, so the subnet mask for the maximum number of hosts would be 255.255.255.248.</p> <p>Each subnet can have 6 hosts, since $2^3 - 2 = 6$ (we subtract 2 because the first and last addresses in each subnet are reserved for the network address and broadcast address, respectively).</p> <p>To determine the IP address of host 3 on subnet 2, we need to determine the network address for subnet 2 and then add 3 to the host portion of that address. To find the network address for subnet 2, we can use the following formula:</p> <p>Network address = (subnet number * number of hosts per subnet) + 1</p> <p>For subnet 2, this would be:</p> <p>Network address = $(2 * 6) + 1 = 13$</p> <p>So the network address for subnet 2 is 205.11.2.13. To find the IP address of host 3 on subnet 2, we add 3 to the host portion of the network address, which gives us:</p> <p>205.11.2.16</p> <p>Therefore, the IP address of host 3 on subnet 2 is 205.11.2.16.</p> | 15 | 3 | 3 | 2 | 2.6.3 |
|-------|---|----|---|---|---|-------|

| (OR) | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|------------|---------------|--|--|--|---|---|------------------|---|--|--|---|--|--------------------|-----------------------------------|------------------------------|------------|----|---|---|---|-------|
| 16)b) | Suppose a company has been assigned the network address 192.168.1.0/24. This network address has 256 available IP addresses. The company wants to create 4 subnets with 64 addresses each, one for each department. i. Calculate the number of subnets and usable hosts per subnet in a subnetted network. (5 marks) ii. Find the subnetwork ID and broadcast ID. (5 marks) iii. How do subnets communicate with each other and with the Internet in a network? (5 marks) | 15 | 3 | 3 | 3 | 3.2.1 | | | | | | | | | | | | | | | | | | |
| 17)a) | I. Differentiate and analyze how the statistical and synchronous time division multiple access techniques work for five input devices and five slots per frame (10 Marks) Differences between statistical and synchronous time division multiplexing (4 marks) Analysis of statistical and synchronous for five input devices and five slots per frame (6 marks) II. Compare and Contrast various multiplexing schemes (5 Marks) Table 5-3 <i>Advantages and disadvantages of multiplexing techniques</i> <table><tr><th>Multiplexing Technique</th><th>Advantages</th><th>Disadvantages</th></tr><tr><td>Frequency Division Multiplexing</td><td>Simple Popular with radio, TV, cable TV Relatively inexpensive All the receivers, such as cellular telephones, do not need to be at the same location</td><td>Analog signals only Limited by frequency ranges</td></tr><tr><td>Synchronous Time Division Multiplexing</td><td>Digital signals Relatively simple Commonly used with T-1 and ISDN</td><td>Wastes bandwidth</td></tr><tr><td>Statistical Time Division Multiplexing</td><td>More efficient use of bandwidth Packets can be various sizes Frame can contain control and error information</td><td>More complex than synchronous time division multiplexing</td></tr><tr><td>Dense Wavelength Division Multiplexing</td><td>Very high capacities over fiber Scalable Signals can have varying speeds</td><td>Cost Complexity</td></tr><tr><td>Code Division Multiplexing</td><td>Large capacities Scalable</td><td>Complexity</td></tr></table> | Multiplexing Technique | Advantages | Disadvantages | Frequency Division Multiplexing | Simple Popular with radio, TV, cable TV Relatively inexpensive All the receivers, such as cellular telephones, do not need to be at the same location | Analog signals only Limited by frequency ranges | Synchronous Time Division Multiplexing | Digital signals Relatively simple Commonly used with T-1 and ISDN | Wastes bandwidth | Statistical Time Division Multiplexing | More efficient use of bandwidth Packets can be various sizes Frame can contain control and error information | More complex than synchronous time division multiplexing | Dense Wavelength Division Multiplexing | Very high capacities over fiber Scalable Signals can have varying speeds | Cost Complexity | Code Division Multiplexing | Large capacities Scalable | Complexity | 15 | 4 | 2 | 2 | 2.6.4 |
| Multiplexing Technique | Advantages | Disadvantages | | | | | | | | | | | | | | | | | | | | | | |
| Frequency Division Multiplexing | Simple Popular with radio, TV, cable TV Relatively inexpensive All the receivers, such as cellular telephones, do not need to be at the same location | Analog signals only Limited by frequency ranges | | | | | | | | | | | | | | | | | | | | | | |
| Synchronous Time Division Multiplexing | Digital signals Relatively simple Commonly used with T-1 and ISDN | Wastes bandwidth | | | | | | | | | | | | | | | | | | | | | | |
| Statistical Time Division Multiplexing | More efficient use of bandwidth Packets can be various sizes Frame can contain control and error information | More complex than synchronous time division multiplexing | | | | | | | | | | | | | | | | | | | | | | |
| Dense Wavelength Division Multiplexing | Very high capacities over fiber Scalable Signals can have varying speeds | Cost Complexity | | | | | | | | | | | | | | | | | | | | | | |
| Code Division Multiplexing | Large capacities Scalable | Complexity | | | | | | | | | | | | | | | | | | | | | | |
| (OR) | | | | | | | | | | | | | | | | | | | | | | | | |
| 17)b) | I. Analyze how phase shift keying can be used when 2 or more bits are coded onto one signal element (7 Marks) QPSK Explanation – (3marks) Illustration of waveform and block diagram (4 marks) | 15 | 4 | 2 | 2 | 2.6.4 | | | | | | | | | | | | | | | | | | |

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| |  <p>II. Demonstrate how to digitize an analog signal using pulse code modulation technique (8 Marks)</p> <p>PCM encoder – 2marks</p> <p>Sampling – 2 marks</p> <p>Quantization – 2marks</p> <p>PCM decoder – 2 marks</p> | | | | | |
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***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