**ANSWER KEY SUBMISSION**

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| **Date of Exam & Session** | 16-03-2023 | **Category of Exam** | CLA2 |
| **Course Name** | Computer Communication | **Course Code** | 18CSS202J |
| **Name of the Faculty submitting** | Dr. R. Surender | **Date of submission of Answer Key** | 20-3-2023 |
| **Department to which the faculty belongs to** | ECE | **Total Marks** | 60 |

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| **Q.No.** | **Questions** |
| 1. | The size of IP address in IPv4 is  a) 2 bytes **b) 32 bits** c) 8bytes d) 100bits |
| 2. | In IPv4 Addresses, classful addressing is replaced with  **a) Classless Addressing** b) Classful Addressing  c) Classful Advertising d) Classless Advertising |
| 3. | In classful addressing, a large part of available addresses is\_\_\_\_\_\_  a) Organized b) Blocked c**) Wasted** d) Communicated |
| 4. | Which of this is not a class of IP address?  a) Class E b) Class C c) Class D **d) Class F** |
| 5 | Network addresses are very important concepts of  a) Routing b) Mask **c) IP Address** d) Classless Address |
| 6 | Name the concept used to divide a large IP network in smaller IP networks   1. Supernetting **b) Subnetting** c) Classful address d) Classless address |
| 7 | Select the operating layer of a hub  **a) Physical layer** b) Datalink layer c) Network layer d**)** Transport layer |
| 8 | A device that connects networks with different protocols \_\_\_\_\_\_\_\_\_  a) Switch b) Hub **c) Gateway** d) repeater |
| 9 | A device which is used to boost the signal between two cable segments is  a) Switch b) Hub c) Gateway **d) repeater** |
| 10 | A device that connects networks with different protocols  a) Switch b) Hub **c) Gateway** d) Repeater |
| 11 | Multiplexing technique that shifts each signal to a different carrier frequency  **a) FDM** b) TDM c) WDM d) OFDM |
| 12 | The conversion in Delta modulation is \_\_\_\_\_\_\_  **a) Analog to digital** b) Digital to analog  c) ADC and DAC d) Analog to Discrete |
| 13 | If link transmits 4000 frames per second, and each slot has 8 bits, the transmission rate of TDM is \_\_\_\_\_\_\_\_\_  **a) 32kbps** b) 50bps c) 60kbps d) 80 kbps |
| 14 | A complex low-pass signal has a bandwidth of 200 kHz, the minimum sampling rate for this signal is  a) 100 kHz b) 200kHz c) 300kHz **d) 400kHz** |
| 15 | A signal is carrying data in which one data element is encoded as one signal element (r = 1). If the bit rate is 100 kbps, what is the average value of the baud rate if c is between 0 and 1?  **a) 50 k baud** b) 100 k baud c) 150 k baud d) 200 k baud |
| 16 | An analog signal carries 4 bits per signal element. If 1000 signal elements are sent per second, find the bit rate?  a**) 4kbps** b) 4Gbps c) 4Tbps d) 4Mkbps |
| 17 | Coaxial cable consists of \_\_\_\_\_\_\_ concentric copper conductors.  a) 1 **b) 2**  c) 3 d) 4 |
| 18 | Terrestrial radio channels are broadly classified into \_\_\_\_ groups.  a) 1 b) 2 c**) 3** d) 4 |
| 19 | In TDM, the transmission rate of the multiplexed path is usually \_\_\_\_\_\_\_ the sum of the transmission rates of the signal sources.  a**) Greater than** b) Lesser than c) Equal to d) infinity |
| 20 | Identify the unguided media in the given options.  a) Fiber optical cable b) Coaxial cable **c) Microwaves** d) Copper wire |

**PART B (4x4= 16)**

**ANSWER ANY 4 QUESTIONS**

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| **Q.No.** | **Questions** |
| 21 | **Explain the concept of dotted decimal notation in addressing.**    128-bit address is divided along 16-bit boundaries, and each 16-bit block is converted to a 4-digit hexadecimal number and separated by colons (Colon-Hex Notation)  **FEDC:BA98:7654:3210:FEDC:BA98:7654:3210** |
| 22 | **Draw the diagram of a three-layer device and explain it**  Overview of a typical router    Routers are the building blocks of wide area networks. Figure 3.10 shows an abstract model of a router as a layer 3 switch. Packets arrive at n input ports and are routed out from n output ports. The system consists of four main parts : input port processors , output port processors , switch fabric (switching network), and switch controller .  Input Port Processor (IPP)  Input and output port processors, as interfaces to switch fabric, are commercially implemented together in router line cards , which contain some of the task of the physical and data link layers . The functionality of the data link layer is implemented as a separate chip in IPP, which also provides a buffer to match the speed between the input and the switch fabric. Switch performance is limited by processing capability, storage elements, and bus bandwidth. The processing capability dictates the maximum rate of the switch. Owing to the speed mismatch between the rate at which a packet arrives on the switch and the processing speed of the switch fabric, input packet rate dictates the amount of required buffering storage. The bus bandwidth determines the time taken for a packet to be transferred between the input and output ports.  An input port processor (IPP) typically consists of several main modules, as shown in Figure 3.11. These modules are packet fragmentation, main buffer , multicast process , routing table , packet encapsulator , and a comprehensive QoS .  **Packet Fragmentation**  The packet fragmentation unit, converts packets to smaller sizes. Large packets cause different issues at the network and link layers. One obvious application of packet fragmentation occurs in typical LANs, in which large packets must be fragmented into smaller frames . Another example occurs when large packets must be buffered at the input port interface of a router, as buffer slots are usually only 512 bytes long. One solution to this problem is to partition packets into smaller fragments and then reassemble them at the output port processor (OPP) after processing them in the switching system. Figure 3.12 shows simple packet fragmentation at the input buffer side of a switch. It is always desirable to find the optimum packet size that minimizes the delay. |
| 523 | **A block of IP addresses is granted to ECE department of SRM university. One of the IP addresses in the block is 205.16.32.36/29. Find the first address, last address and number of addresses in the block?**  Given address 11001101 00010000 00100000 00100100.  205.16.32.36  First address 11001101 00010000 00100000 00100000.  205.16.32.32  Last address 11001101 00010000 00100000 00100111.  205.16.32.39  Number of addresses:2(32-29)=8 |
| 24 | **With the help of a diagram explain the concept of a Bipolar line coding technique.**  This is an encoding technique which has three voltage levels namely +, - and 0. Such a signal is called as duo-binary signal.  An example of this type is Alternate Mark Inversion AMIAMI. For a 1, the voltage level gets a transition from + to – or from – to +, having alternate 1s to be of equal polarity. A 0 will have a zero-voltage level.  Even in this method, we have two types.  • Bipolar NRZ  • Bipolar RZ  The following figure clearly depicts this.    The pulse duration and symbol bit duration are equal in NRZ type, while the pulse duration is half of the symbol bit duration in RZ type.  Advantages  • It is simple.  • No low-frequency components are present.  • Occupies low bandwidth than unipolar and polar NRZ schemes.  • This technique is suitable for transmission over AC coupled lines, as signal drooping doesn’t occur here.  • A single error detection capability is present in this.  Disadvantages  • No clock is present.  • Long strings of data causes loss of synchronization |
| 25 | **An analog signal has a bit rate of 4000 bps and band rate of 500 baud. How many data elements are carried by each signal element? How many signal elements do we need?** |
| **26** | **Illustrate the concept of WDM with the help of a diagram**.  Wavelength-division multiplexing (WDM) is designed to use the high-data-rate capability of fiber-optic cable.  The optical fiber data rate is higher than the data rate of metallic transmission cable. Using a fiber-optic cable for one single line wastes the available bandwidth.  Multiplexing allows us to combine several lines into one. WDM is conceptually the same as FDM, except that the multiplexing and demultiplexing involve optical signals transmitted through fiber-optic channels.  The idea is the same: We are combining different signals of different frequencies. The difference is that the frequencies are very high.  Although WDM technology is very complex, the basic idea is very simple. We want to combine multiple light sources into one single light at the multiplexer and do the reverse at the demultiplexer.  The combining and splitting of light sources are easily handled by a prism. Recall from basic physics that a prism bends a beam of light based on the angle of incidence and the frequency.  Using this technique, a multiplexer can be made to combine several input beams of light, each containing a narrow band of frequencies, into one output beam of a wider band of frequencies.  A demultiplexer can also be made to reverse the process. |

**PART C (2x12= 24)**

**ANSWER THE QUESTIONS**

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| **Q.No.** | **Questions** |
| **27** | An organization is granted with IP address 192.16.2.0/24. The administration wants to create 4 subnets. Calculate the following   1. Find the subnet mask 2. Number of hosts in each subnet   3) First & Last host address of each subnet  4) Network & Broadcast address of each subnet      F:\jan 2021-may 2021\computer and communication\unit 2\5.PNG    (or)  b) With the help of a neat sketch explain the following network devices a) Hub b) Repeaters c) Switch. |
| **28** | a**) Discuss in detail about the following digital modulation technique with the help a neat sketch a) ASK b) PCM.**    In **amplitude shift keying**, the amplitude of the carrier signal is varied to create signal elements. Both frequency and phase remain constant while the amplitude changes.  Although we can have several levels (kinds) of signal elements, each with a different amplitude, ASK is normally implemented using only two levels. This is referred to as binary amplitude shift keying or *on-off keying* (OOK). The peak amplitude of one signal level is 0; the other is the same as the amplitude of the carrier frequency. gives a conceptual view of binary ASK.  Although the carrier signal is only one simple sine wave, the process of modulation produces a  nonperiodic composite signal. This signal, as was discussed in Chapter 3, has a continuous set of frequencies. As we expect, the bandwidth is proportional to the signal rate (baud rate). However, there is normally another factor involved, called *d,* which depends on the modulation and filtering process. The value of *d* is between 0 and 1. This means that the bandwidth can be expressed as shown, where 5 is the signal rate and the *B* is the bandwidth.  *B* =(1 *+d)* x *S*    **Advantages of amplitude shift Keying –**  It can be used to transmit digital data over optical fiber.  The receiver and transmitter have a simple design which also makes it comparatively inexpensive.  It uses lesser bandwidth as compared to FSK thus it offers high bandwidth efficiency.  **Disadvantages of amplitude shift Keying –**  It is susceptible to noise interference and entire transmissions could be lost due to this.  It has lower power efficiency.  The transmitter section of a **Pulse Code Modulator** circuit consists of Sampling, Quantizing and Encoding, which are performed in the analog-to-digital converter section. The low pass filter prior to sampling prevents aliasing of the message signal. Sampler This is the technique which helps to collect the sample data at instantaneous values of message signal, so as to reconstruct the original signal. The sampling rate must be greater than twice the highest frequency component W of the message signal, in accordance with the sampling theorem.  The sampling process is sometimes referred to as pulse amplitude modulation (PAM). We need to remember, however, that the result is still an analog signal with nonintegral values Quantizer Quantizing is a process of reducing the excessive bits and confining the data. The sampled output when given to Quantizer, reduces the redundant bits and compresses the value.   Encoder The digitization of analog signal is done by the encoder. It designates each quantized level by a binary code. The sampling done here is the sample-and-hold process. These three sections LPF, Sampler, and Quantizer LPF, Sampler, andQuantizer will act as an analog to digital converter. Encoding minimizes the bandwidth used.    (or)  **b) List the different types of guided media used in communication channel and explain them in detail.**  **Types Of Guided media:** Twisted pair:Twisted pair is a physical media made up of a pair of cables twisted with each other. A twisted pair cable is cheap as compared to other transmission media. Installation of the twisted pair cable is easy, and it is a lightweight cable. The frequency range for twisted pair cable is from 0 to 3.5KHz. A twisted pair consists of two insulated copper wires arranged in a regular spiral pattern.  The degree of reduction in noise interference is determined by the number of turns per foot. Increasing the number of turns per foot decreases noise interference. **Types of Twisted pair:**Unshielded Twisted Pair: An unshielded twisted pair is widely used in telecommunication. Following are the categories of the unshielded twisted pair cable:   * **Category 1:** Category 1 is used for telephone lines that have low-speed data. * **Category 2:** It can support upto 4Mbps. * **Category 3:** It can support upto 16Mbps. * **Category 4:** It can support upto 20Mbps. Therefore, it can be used for long-distance communication. * **Category 5:** It can support upto 200Mbps.   **Advantages Of Unshielded Twisted Pair:**   * It is cheap. * Installation of the unshielded twisted pair is easy. * It can be used for high-speed LAN.   **Disadvantage:**   * This cable can only be used for shorter distances because of attenuation.  Shielded Twisted Pair A shielded twisted pair is a cable that contains the mesh surrounding the wire that allows the higher transmission rate.  **Characteristics Of Shielded Twisted Pair:**  The cost of the shielded twisted pair cable is not very high and not very low.  An installation of STP is easy.   1. It has higher capacity as compared to unshielded twisted pair cable. 2. It has a higher attenuation. 3. It is shielded that provides the higher data transmission rate.   **Disadvantages**   1. It is more expensive as compared to UTP and coaxial cable. 2. It has a higher attenuation rate.  Coaxial Cable  1. Coaxial cable is very commonly used transmission media, for example, TV wire is usually a coaxial cable. 2. The name of the cable is coaxial as it contains two conductors parallel to each other. 3. It has a higher frequency as compared to Twisted pair cable. 4. The inner conductor of the coaxial cable is made up of copper, and the outer conductor is made up of copper mesh. The middle core is made up of non-conductive cover that separates the inner conductor from the outer conductor. 5. The middle core is responsible for the data transferring whereas the copper mesh prevents from the EMI (Electromagnetic interference).   **Advantages Of Coaxial cable:**   1. The data can be transmitted at high speed. 2. It has better shielding as compared to twisted pair cable. 3. It provides higher bandwidth.   **Disadvantages Of Coaxial cable:**   1. It is more expensive as compared to twisted pair cable. 2. If any fault occurs in the cable causes the failure in the entire network.  Fibre Optic  1. Fibre optic cable is a cable that uses electrical signals for communication. 2. Fibre optic is a cable that holds the optical fibres coated in plastic that are used to send the data by pulses of light. 3. The plastic coating protects the optical fibres from heat, cold, electromagnetic interference from other types of wiring. 4. Fibre optics provide faster data transmission than copper wires.   **Basic elements of Fibre optic cable:**  **Core:** The optical fibre consists of a narrow strand of glass or plastic known as a core. A core is a light transmission area of the fibre. The more the area of the core, the lighter will be transmitted into the fibre.  **Cladding:** The concentric layer of glass is known as cladding. The main functionality of the cladding is to provide the lower refractive index at the core interface as to cause the reflection within the core so that the light waves are transmitted through the fibre.  **Jacket:** The protective coating consisting of plastic is known as a jacket. The main purpose of a jacket is to preserve the fibre strength, absorb shock and extra fibre protection. |