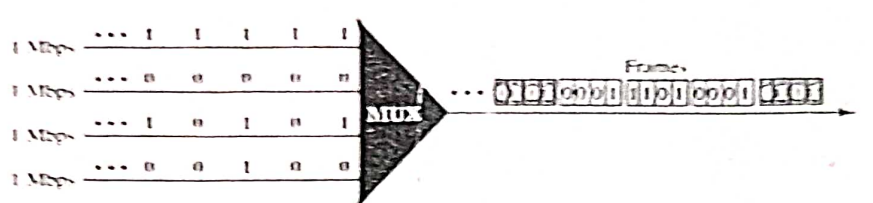


$$W_{tr} = Q_{bw} \times \log_2 L \quad (L = \text{panjang})$$

	<p>frequencies have an amplitude of 0 V. Draw the frequency domain of the signal</p> <p>b) A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network?</p>	5
5.	<p>a)</p>  <p>synchronous TDM with a data stream for each input and one data stream for the output. The unit of data is 1 bit.</p> <p>Find</p> <ol style="list-style-type: none"> (1) The input bit duration (1 Marks) (2) The output bit duration (1 Marks) (3) The output bit rate (1 Marks) (4) The output frame rate (2 Marks) <p>b) What are the propagation time and the transmission time for a <u>5-Mbyte</u> message (an image) if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s.</p>	5

$$\frac{12000 * 5000 * 8}{2.4 * 10^8}$$

$$\frac{5}{1000}$$

$$\frac{5000}{1000}$$

~
7



VIT
Vellore Institute of Technology
Vellore, Tamil Nadu 620 015

School of Information Technology and Engineering

Fall Semester 2022-2023

Continuous Assessment Test – II

Programme Name & Branch: MCA

Course Name & code: Data Communication and Networking & ITA5063

Class Number (s): VL2022230105117, VL2022230105122, VL2022230106227

Slot: E2+TE2

Faculty Name: Prof K.Santhi, Prof T Senthil Kumar, Prof M Ramalingam

Exam Duration: 90 Mins.

Maximum Marks: 50

Answer all the questions

Q.No.	Question	Max Marks
1.	<p>A path in a digital circuit switched network has a data rate of 2 Mbps. The exchange of 100 bits is required for the setup and teardown phases. The distance between two parties is 500 km. Answer the following questions if the propagation speed is 1×10^8 m/sec:</p> <p>a. What is the total delay if 100 bits of data are exchanged during the setup phase?</p> <p>b. What is the total delay if 10,000 bits of data are exchanged during the data-transfer phase?</p> <p>c. What is the total delay if 1,00,000 bits of data are exchanged during the data-transfer phase?</p> <p>d. Find the delay per 100 bits of data for each of the above cases and compare them. What can you infer?</p>	10
2.	<p>i) A sender needs to send the four data items 3456, ABCC, 02BC, and EEEE. Answer the following:</p> <p>a. Find the checksum at the sender side</p> <p>b. Find the checksum at the receiver side if there is no error.</p> <p>c. Find the checksum at the receiver side if the second data item is changed to ABCE.</p> <p>d. Find the checksum at the receiver side if the second data item is changed to ABCE and the third data item is changed to 02BA. (8 marks)</p>	10

<p>✓</p>	<p>ii) What is the Hamming distance for each of the following codewords?</p> <p>a. $d(10000, 00000)$ b. $d(10101, 10000)$ c. $d(11111, 11111)$ d. $d(000, 000)$ (2 marks)</p>	
<p>3.</p> <p>6</p>	<p>i) Draw the sender and receiver windows for a system using Go-Back-N ARQ for the following.</p> <p>a. Frame 0 is sent; frame 0 is acknowledged. b. Frames 1 and 2 are sent; frames 1 and 2 are acknowledged. c. Frames 3, 4 and 5 are sent; frame 4 is acknowledged; timer for frame 5 expires. d. Frames 5, 6 and 7 are sent; they are lost (5 marks)</p> <p>ii) A receiver receives the code 11001100111. When it uses the Hamming encoding algorithm, the redundancy bits is 0101. Which bit is in error? What is the correct code? (5 marks)</p>	<p>10</p>
<p>4.</p> <p>✓</p>	<p>i) Given the dataword 1010011110 and the divisor 10111.</p> <p>(i) Show the generation of the codeword at the sender side using binary division. (ii) Show the checking of the codeword at the receiver site (assume single bit error). (5 marks)</p> <p>ii) A slotted ALOHA network transmits 300-bit frames on a shared channel of 100 kbps. What is the throughput produced by the system (all stations together)? (5 marks) for 1000 frames?</p>	<p>10</p>
<p>5.</p> <p>✓</p>	<p>i) In selective repeat protocol, suppose frames through 0 to 5 have been transmitted. Now, imagine that 0 times out 6 (a new frame) is transmitted, frame 1 ack received, frame 2 lost and new frames 7, 8, 9, 10 are transmitted.</p> <p>At this point, what will be the outstanding series of packets in sender's window? (5 marks)</p> <p>ii) Assume a sender sends 6 packets: packet 0, 1, 2, 3, 4 and 5. The sender receives an ack with ackno.3. Draw the sender receiver window using Go Back N & Selective Repeat protocols. (5 marks)</p>	<p>10</p>



KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Discuss the functionalities of the protocols used in each layer of the OSI model and illustrate the communication between two end systems with a neat sketch.
2. We need to use synchronous TDM and combine 20 digital sources each of 100 Kbps. Each output slot carries 1 bit from each digital source but one extra bit is added to each frame for synchronization.
 - a) What is the size of an output frame in bit?
 - b) What is output frame rate?
 - c) What is duration of the output frame?
 - d) What is output data rate?
 - e) What is efficiency of the system?
3.
 - a) If the baud rate of the signal is 600 baud/sec and each signal unit carries 6 bits. Find the bit rate of the signal. [5]
 - b) A network bandwidth of 10Mbps can pass only an average of 12000 frames per minute with each frame carrying average of 10,000 bits what is throughput of this network? [5]
4. A path in a digital circuit-switched network has a data rate of 1 Mbps. The exchange of 1000 bits is required for the setup and teardown phases. The distance between two parties is 5000 km.

Answer the following questions if the propagation speed is 2×10^8 m:

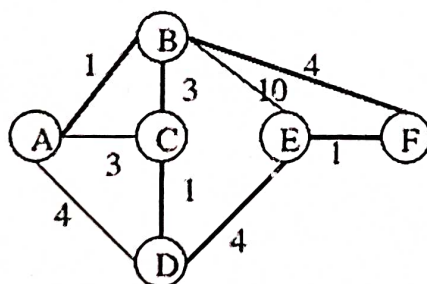
- i. What is the total delay if 1000 bits of data are exchanged during the data-transfer phase?
- ii. What is the total delay if 100,000 bits of data are exchanged during the data-transfer phase?
- iii. What is the total delay if 1,000,000 bits of data are exchanged during the data-transfer phase?
- iv. Find the delay per 1000 bits of data for each of the above cases and compare them. What can you infer?

5. Five equal-size datagrams belong to the same message leave for the destination one after another. However, they travel through different path as shown in the following table.

Datagram	Path Length	Visited Switches
1	3200 km	1,3,5
2	11,700 km	1,2,5
3	12,200 km	1,2,3,5
4	10,200 km	1,4,5
5	10,700 km	1,4,3,5

We assume that the delay for each switch (including waiting and processing) is 3,10,20,7 and 20 ms respectively. Assuming that the propagation speed is 2×10^8 M/S. Find the order the datagram arrive at the destination and the delay for each ignore any other delays in transmission.

6. a) A slotted aloha network transmits 200-bit frame on a shared channel of 200 Mbps. What is the throughput if the system (all station together) produces 3000 frames/sec. [5]
 b) A network has data transmission bandwidth 20 Mbps. It uses CSMA/CD in the MAC layer. The max signal propagation time from one node to another node is 40 microsecond. What is minimum size of a frame in the network represent in bytes. [5]
7. a) One of the addresses in a block is **110.23.120.14/20**. Find the number of addresses, the first address, and the last address in the block. [5]
 b) A datagram is carrying 2000 bytes of data. If there is no option information, what is the value of the header length field and what is the value of total length field? [5]
8. Consider the network shown below. Show the operation of Distance vector routing algorithm for computing the least cost path from F (the rightmost node in the figure below) to all destinations. Also explicitly list all the shortest path routes from F to all destinations that are the result of the algorithm's computation. Depict all the steps through diagram.



9. a) Elaborate in detail about the UDP datagram format. [5]
 b) TCP opens a connection using an initial sequence number (ISN) of 14,534. The other party opens the connection with an ISN of 21,732. Show the three TCP segments during the connection establishment. [5]
10. Explain the following:
- a) Remote login protocols [5]
 b) SNMP [5]



KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

Application
Transport
Network
Data Link
Physical

1. Elaborate in detail about the TCP/IP Architecture with an explanation of each layer in it. [5]
2. a) What are the propagation time and the transmission time for a 100-Mbyte message if the bandwidth of the network is 2 Mbps? Assume that the distance between the sender and the receiver is 10,000 km and that light travels at 2.4×10^8 m/s. [5]
- b) Elaborate on how data signals are transmitted using the frequency division multiplexing technique with a suitable diagram [5]
3. a) Compare and Contrast Packet Switching Networks and Circuit Switching Networks [5]
- b) Assume the data received from the network layer at the sender side is DDDEFEDDEDF. Perform Byte stuffing to send to the receiver. (Note: E & F – Escape and Flag Characters respectively) [3]
- c) Assume the data received from the network layer at the sender side is 1100011111110011111101100011. Perform Bit stuffing to send to the receiver. [2]
4. A path in a digital circuit-switched network has a data rate of 5 Mbps. The exchange of 500 bits is required for the setup and teardown phases. The distance between the two parties is 2500 km. Calculate the total delay incurred for this process and assume that there is no transmission initiated during the data transfer phase.
5. Define the following parameters for a switching network:
 - N= number of hops between two given end systems
 - L= message length in bits 500
 - B= data rate in bits per second (bps), on all links 5 Mbps
 - P= packet size
 - H= overhead (header) bits per packet
 - S= call setup time (circuit switching or virtual circuit) in seconds
 - D= propagation delay per hop in seconds

For N=4, L=3200, B=9600, p=1024, H=16, S=0.2, D=0.001, compute the end-to-end delay for circuit and packet switching. Assume there are no acknowledgements, and no queuing delay.
6. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$.
 - a) What is the actual bit string transmitted?
 - b) Suppose the third bit from the left is inverted during transmission. How will the receiver detect this error?

7. Assume an organization is allotted with a block of IPV4 addresses. One of the IP among the block is 162.18.19.34/24. Identify the following from the given input.
- i) Start address of the block
 - ii) End address of the block
 - iii) Total Number of IP addresses in the block
 - iv) Perform 4 subnets in the given block of IP addresses
 - v) Identify the subnet mask
8. a) Compare and contrast IPV4 and IPV6 (any 7 Points) [5]
- b) Summarize the various techniques used for preventing congestion in a TCP network [5]
9. a) Draw the IP datagram packet and the necessary fields of IP datagram header. [5]
- b) Assume that, video conferencing is taking place between host A and host B. What type of services is required for this communication in the transport layer? Justify with your answer. [5]
10. Elaborate in detail about the role and working process of Domain Name System in Internet.

⇔⇔⇔

widest
Acknowledgment
Disorder
Addition
retransmission