

**Continuous Assessment Test I – May 2023**

<b>Programme</b>	<b>: B.Tech.</b>	<b>Semester</b>	<b>: FALL INTER '22-23</b>
<b>Course</b>	<b>: Computer Networks</b>	<b>Code</b>	<b>: BCSE308L</b>
		<b>Slot</b>	<b>: E1+TE1</b>
<b>Faculty</b>	<b>: Dr. Punitha K</b> <b>Dr. Jayanthi R</b> <b>Dr. Anita X</b> <b>Dr. Subbulakshmi P</b> <b>Dr. A Swaminathan</b> <b>Dr. Ganala Santoshi</b> <b>Dr. Radha R</b> <b>Dr. N G Bhuvaneshwari</b> <b>Dr. Sahaya Beni Prathiba B</b> <b>Dr. Bhavadharini R M</b> <b>Dr. S A Amutha Jeevakumari</b> <b>Dr. Renjith</b> <b>Dr. Rajesh R</b>	<b>Class Nbr</b>	<b>: CH2022232500725</b> <b>CH2022232501082</b> <b>CH2022232501081</b> <b>CH2022232500965</b> <b>CH2022232500723</b> <b>CH2022232500962</b> <b>CH2022232500964</b> <b>CH2022232500968</b> <b>CH2022232500963</b> <b>CH2022232500727</b> <b>CH2022232500728</b> <b>CH2022232500726</b> <b>CH2022232500724</b>
<b>Time</b>	<b>: 90 Minutes</b>	<b>Max. Marks</b>	<b>: 50</b>

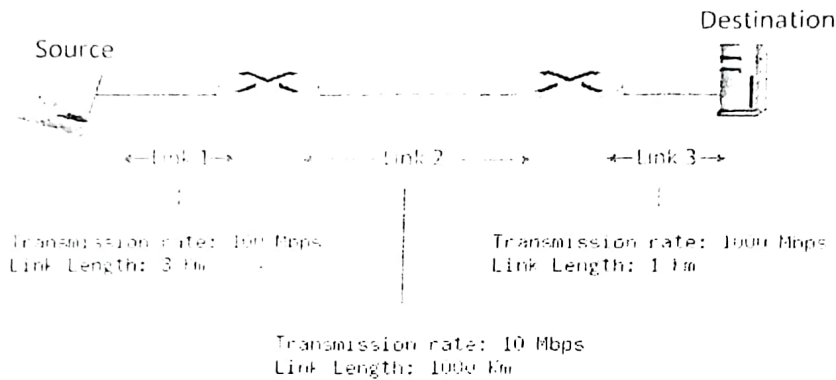
**Answer ALL the questions**

<b>Q. No.</b>	<b>Question Text</b>	<b>Marks</b>
1.	<p>Assume that you need to connect four Local Area Networks at XYZ Company. Each LAN has 30 Computer Systems. LAN1 and LAN2 are connected to Router 1. LAN3 and LAN 4 are connected to Router 2. Router 1 and Router 2 are connected directly.</p> <p>i) Draw a hybrid topology to show the above network design. [3 Marks]</p> <p>ii) Calculate the number of physical links required for all the LANs together if it uses bus, ring, star and mesh topology. [4 Marks]</p> <p>iii) Discuss the advantages of these network topologies in terms of installation cost, fault detection and network scalability. [3 Marks]</p>	10
2.	<p>A network requires a flow control mechanism with following characteristic:</p> <ul style="list-style-type: none"> <li>3 bits are allocated for representing sequence number</li> <li>Bandwidth should be efficiently utilized</li> <li>Only the lost frames need to be retransmitted</li> </ul> <p>Illustrate the flow control mechanism that suits the above mentioned network.</p>	10
3.	<p>Pranav wants to send the bits 110011110101 to his brother Pranesh. As transmission impairments are possible, errors can happen during the course of transmission. Pranav does not want to retransmit the frame if it encounters single bit error i.e., receiver should be able to detect and correct the single bit error. So, help Pranav to choose an error control strategy to address this scenario and generate the code word.</p>	10
4.	<p>Consider the figure below, with three links, each with the specified transmission rate and link length. Assume that Source divides a message into 3 packets of 8000 bits each and transmits to the destination using packet switching.</p>	10

$$TD = \frac{\text{Packet length}}{\text{Data rate}}$$

Data rate

= 8000



The speed of the light is the propagation delay on each link ( $3 \times 10^8$  m/sec). Compute the total time required for the entire message to reach the destination. Ignore Processing delay. There is no queuing delay involved here.

Assume that you are requesting a video in a YouTube from a browser. Illustrate the process with a neat diagram using an appropriate approach.[6 Marks]

Also, list out the various protocols and hardware components involved in each layer of the TCP/IP Model [4 Marks]

10

Name:



# VIT

Vellore Institute of Technology  
(Declared to be University under section 3 of UGC Act, 1956)

## Continuous Assessment Test II – July 2023

Programme	: B.Tech.	Semester	: FALL INTER '22-23
Course	: Computer Networks	Code	: BCSE308L
		Slot	: E1+TE1
Faculty	: Dr. Punitha K Dr. Jayanthi R Dr. Anita X Dr. Subbulakshmi P Dr. A Swaminathan Dr. Ganala Santoshi Dr. Radha R Dr. N G Bhuvaneswari Amma Dr. Sahaya Beni Prathiba B Dr. Bhavadharini R M Dr. S A Amutha Jeevakumari Dr. Renjith Dr. Rajesh R	Class Nbr	: CH2022232500725 CH2022232501082 CH2022232501081 CH2022232500965 CH2022232500723 CH2022232500962 CH2022232500964 CH2022232500968 CH2022232500963 CH2022232500727 CH2022232500728 CH2022232500726 CH2022232500724
Time	: 90 Minutes	Max. Marks	: 50

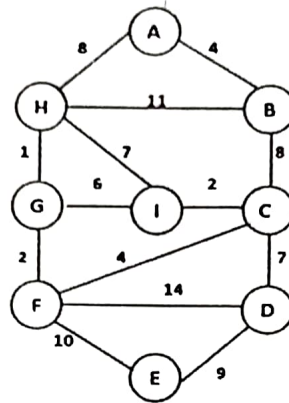
Answer ALL the questions

Q. No.	Question Text	Marks
✓ 1.	Considering the CSMA/CD protocol, with nodes A and B attached to opposite ends of a cable having a propagation delay of 12.5 ms, both nodes attempt to transmit at time $t=0$ . The frames collide, and after the first collision, Node A draws $r=0$ and Node B draws $r=1$ in the exponential backoff protocol. Disregarding the jam signal, what is the time (in seconds) at which Node B receives the complete packet transmitted by Node A? The link has a bandwidth of 10 Mbps, and the packet size is 1000 bits.	10
2.	<p>✓ i. In a network scenario, a router receives a datagram consisting of 3000 bytes and needs to transmit it to a link with a maximum transmission unit (MTU) of 500 bytes. Analyze the fragmentation process by determining the number of fragments produced. Additionally, provide the values of the More Fragments (MF) flag, the Offset, and the Total Length for each fragment. [7 Marks]</p> <p>✓ ii. In a pure Aloha network, stations transmit frames of size 1000 bits at a rate of 1 Mbps. Calculate the vulnerable time for this network. [3 Marks]</p>	10
3.	<p>An Internet Service Provider (ISP) is granted a block of addresses starting with 152.80.0.0/16. The ISP wants to distribute these blocks to 2800 customers as follows:</p> <ul style="list-style-type: none"> <li>•The first group has 400 medium-sized businesses; each needs 128 addresses.</li> <li>•The second group has 400 small businesses; each needs 16 addresses.</li> <li>•The third group has 2000 households; each needs 4 addresses.</li> </ul>	10

- a) Design the sub-blocks and give the slash notation for each group. [8 Marks]  
b) Find out how many addresses are still available after these allocations.[2 Marks]

4.

In a network with nodes A to I, you are using node A and striving to establish communication with all other nodes by optimizing costs. How can you leverage Dijkstra's algorithm to determine the shortest path from node A to each of the other nodes based on the given graph.



10

5.

i. The routing table of a router is shown below-

Destination	Mask	Interface
128.75.43.0	255.255.255.0	eth0
128.75.43.0	255.255.255.128	eth1
192.12.17.5	255.255.255.255	eth3
Default		eth2

On which interfaces will the router forward packets addressed to destination 128.75.43.16 and 192.12.17.10 respectively? Explain. [5 Marks].

10

ii. Considering that computer A and computer B have IP addresses 10.105.1.113 and 10.105.1.91 respectively, and they both utilize the netmask 255.255.255.224, what criteria can be used to determine if their IP addresses belong to the same network? [5 Marks].



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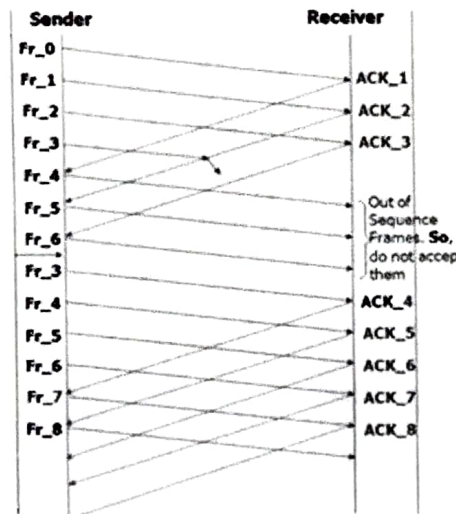
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**Final Assessment Test (FAT) - APRIL/MAY 2023**

Programme	<b>B.Tech</b>	Semester	<b>Winter Semester 2022-23</b>
Course Title	<b>COMPUTER NETWORKS</b>	Course Code	<b>BCSE308L</b>
Faculty Name	<b>Prof. Renuka Devi S</b>	Slot	<b>F1+TF1</b>
		Class Nbr	<b>CH2022235000731</b>
Time	<b>3 Hours</b>	Max. Marks	<b>100</b>

**Section-1 (10 X 10 Marks)****Answer All questions**

- ✓ 01. (i) Suppose, if there is a change in the service provided by one layer of OSI; For e.g. layer 3, will that effect layer 4 and layer 2? Justify your answer (3 marks). [10]  
 ii) Mention the purpose of having the international standards for network protocols? Defend it in a positive and negative way. (3 marks).  
 iii) Bridges work best where traffic from one segment of a network to other segments is not too high. Mention the types of network traffic problems a bridge is incapable to solve. Explain. (4 marks).
- ✓ 02. User A wants to design one network lab with 70 systems and a Server. Help user A by exploring all the possible ways in structuring the lab with all its merits and demerits. Also, list out all the possible networking devices needed for the lab to function properly. [10]
03. Compute the latency for a data packet of size 1070 bytes by considering the below given communication mediums. The network has bandwidth of 12 Mbps, the distance is 1700 km, and there are two nodes before destination. Each node takes 300 microseconds for processing and forwarding a packet. Identify the components of latency and respective delays. Clearly state and assume value for any data required for the computation. The propagation speed of communication medium, [10]  
 • a copper cable is  $2.3 \times 10^8$  m/s  
 • an optical Fiber is  $2.0 \times 10^8$  m/s
- ✓ 04. (i) Solve the following using Cyclic Redundancy Check (CRC) in both sender side and receiver side. Message (M) = 1010001101 Divisor (D) = 110101 (8 Marks) [10]  
 (ii) If suppose m is the number of message bits and r is the number of redundant bits, the error correction method should satisfy the equation:  $2^r \geq m + r + 1$  to find the errors. So the hamming code error correction technique uses 4 redundant bits for detecting the errors in 7 message bits. Discuss why you will not be able to detect the errors in the above scenario with 3 redundant bits. (2 marks)
05. Identify the flow control mechanism used in the following scenario and mention the disadvantages. Suggest alternative protocol that could overcome the limitations. Explain the response of the suggested protocol for the given scenario with a neat diagram. [10]



06. Consider the following (hexadecimal) values in an IP header.

[10]

Version: 4

HLEN: 5

ToS: 0

Total length: 28

Identification bit: 1

Flag: 0

Fragmentation offset: 0

TTL: 4

Protocol: 6

Source IP: 10101211

Destination IP: 14020301

Calculate the checksum (hexadecimal Value) and explain the verification at the receiver side.

07. Assume two organizations A & B need some IP addresses for their systems from the available chunk 138.101.114.250/20. Consider yourself as the in charge of ISP and [10]

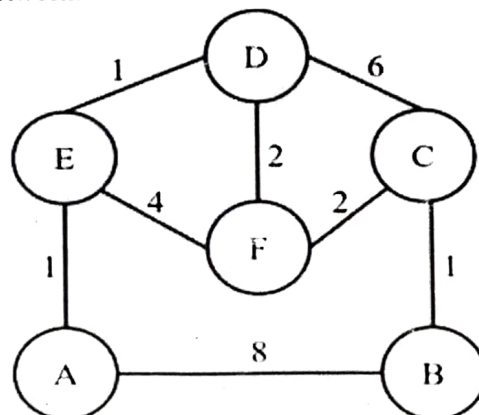
allocate 500 available IP addresses to A and 300 of the available addresses to B. The rest is kept

reserved.

- Find the first and last address of the organization A and B. (4 marks)
- Calculate the number of valid hosts in each organization. (3 marks)
- Determine the remaining address after allocation. (3 marks)

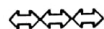
08. Consider the given sample network.

[10]



Construct the Routing table for node 'A' by applying Dijkstra's algorithm.

- ✓ 09. Suppose you are a software engineer who is working on developing a new application that uses the TCP protocol to transfer data between a client and a server. You are tasked with designing the TCP header for this application. What fields would you include in the TCP header and explain. Also would you include any options in the header, and if so, which ones and why? Additionally, how would you ensure that the TCP header provides enough information to reliably transfer data between the client and the server? [10]
- ✓ 10. You are a technical support representative for a web hosting company. A customer has contacted you to report a problem in accessing their website from their computer. You suspect that the issue might be related to the DNS resolution. How would you explain the DNS protocol to the customer and the role it plays in accessing their website? Describe the steps involved in the DNS resolution process, and how does it work to translate domain names into IP addresses? [10]





Final Assessment Test (FAT) - July/August 2023

Programme	B.Tech.	Semester	Fall Inter Semester 22-23
Course Title	COMPUTER NETWORKS	Course Code	BCSE308L
Faculty Name	Prof. Renjith P N	Slot	E1+TE1
		Class Nbr	CH2022232500726
Time	3 Hours	Max. Marks	100

SECTION-1 (10 X 10 Marks)

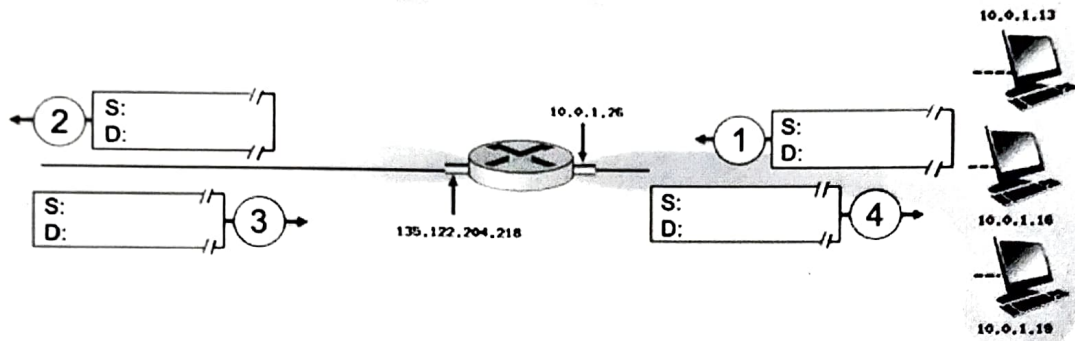
Answer all questions

01. ☒ (a) Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device? [2 Marks] [10]
- ☒ (b) For each of the following four networks, discuss the consequences if a connection fails. [4 Marks]
- Five devices arranged in a mesh topology
  - Five devices arranged in a star topology (not counting the hub)
  - Five devices arranged in a bus topology
  - Five devices arranged in a ring topology
- ☒ (c) Assume we have two computers connected by an Ethernet hub at home. Is this a LAN or a WAN? Explain the reason. [4 Marks]
02. ☒ Consider a network that has switches which allows traffic from source to destination. All the packets generated by source A need to travel in the same path, but the packets may arrive at destination B with different delays, if resource allocation is on demand. Discuss briefly the switching technique that satisfies the above-mentioned condition and explain the different phases of its operation. [10]
03. a. ☒ A network with bandwidth of 10 Mbps can pass only an average of 12000 frames per minute where each frame carries an average of 10000 bits. Calculate the throughput for this network? [4 Marks] [10]
- ☒ b. Assuming the distance between sender and receiver is 12,000 km and speed of light is  $2.4 \times 10^8$  m/s, compute the propagation time and the transmission time for a 2.5 Kbyte message when the bandwidth of the network is 1 Gbps? [4 Marks]
- ☒ c. List the parameters to measure performance of the network. [2 Marks]
04. ☒ a. In Go-back-N ARQ, the size of the sender window must be less than  $2^m$ , where m is the number of bits used for the representation of sequence numbers. With an example, show why the size of the sender window must be strictly less than  $2^m$ . [7 marks] [10]
- ☒ b. A Selective Repeat ARQ is using 7 bits to represent the sequence numbers. Find out the maximum size of the sliding window? [3 marks]
05. ☒ Demonstrate the single bit error detection and correction mechanism using hamming code generated for the message "good" (ASCII Hex value to be used) [ASCII Values: g-103, o-111, d-100] [10]
06. ☒ Consider the scenario below in which three hosts, with private IP addresses 10.0.1.13, 10.0.1.16, 10.0.1.19 are in a local network behind a NAT's router that sits between these three hosts and the larger Internet. IP datagrams being sent from, or destined to, these three hosts must pass through



this NAT router. The router's interface on the LAN side has IP address 10.0.1.26, while the router's address on the Internet side has IP address 135.122.204.218.

NAT translation table	
WAN side addr	LAN side addr
135.122.204.218	10.0.1.19



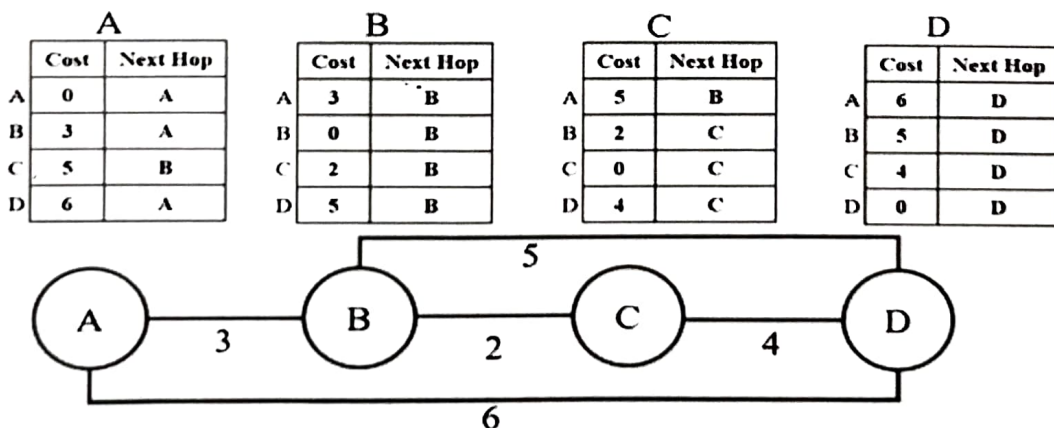
Suppose a host with IP address 10.0.1.19 sends an IP datagram destined to host 128.119.173.185 with source port number 3443, and destination port number 80, what will be the source and destination IP address at points 1, 2, 3 and 4? Explain your answer in detail.

07. Consider an IPv4 packet has the following hexadecimal digits: 0x4500001E00000000071100001B0A130A20D1B06

- How many bytes of data are being carried by this packet? [2 Marks]
- How many hops are possible to reach the destination? [2 Marks]
- Calculate the checksum. [6 Marks]

08. In distance-vector routing, the good news, i.e., a decrease in a link metric will propagate fast. If a link distance decreases, all nodes quickly learn about it and update their vectors. The following figure shows a stable four-node network, but suddenly the distance between nodes A and D, which is currently 6, is decreased to 1, probably due to some improvement in the link quality.

- Show how this good news is propagated. [4 Marks]
- Compute the new distance vector for each node after stabilization. [6 Marks]



09. A process in node A is communicating with another process in node B over the internet. Totally five data packets were exchanged between the two processes and then connection was terminated. Illustrate from the connection establishment to the termination by considering the flag field of the TCP header with a proper timeline diagram for the above scenario.

- ✓ 10. Assume that an user is trying to visit `gaia.cs.umass.edu`, but his browser doesn't know the IP address of the website. In this example, examine the difference between an iterative and recursive DNS query. Which type of query is considered best practice? Justify your answer. [10]

