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. Bhavadharini R M	Slot	E1+TE1
		Class Nbr	CH2022232500727
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 2.4×10^8 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   [10]

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	10.0.1.26
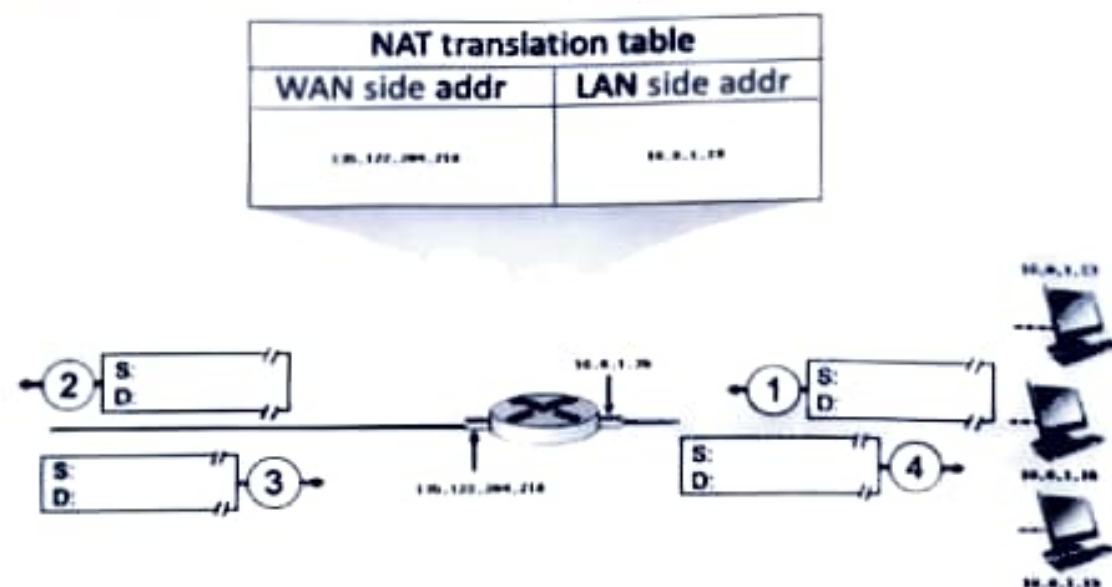
Suppose a host with IP address 10.0.1.19 sends an IP datagram destined to host 128.119.173.185 with source port number 3443, and destination port number 80, what will be the source and destination IP address at points 1, 2, 3 and 4? Explain your answer in detail.

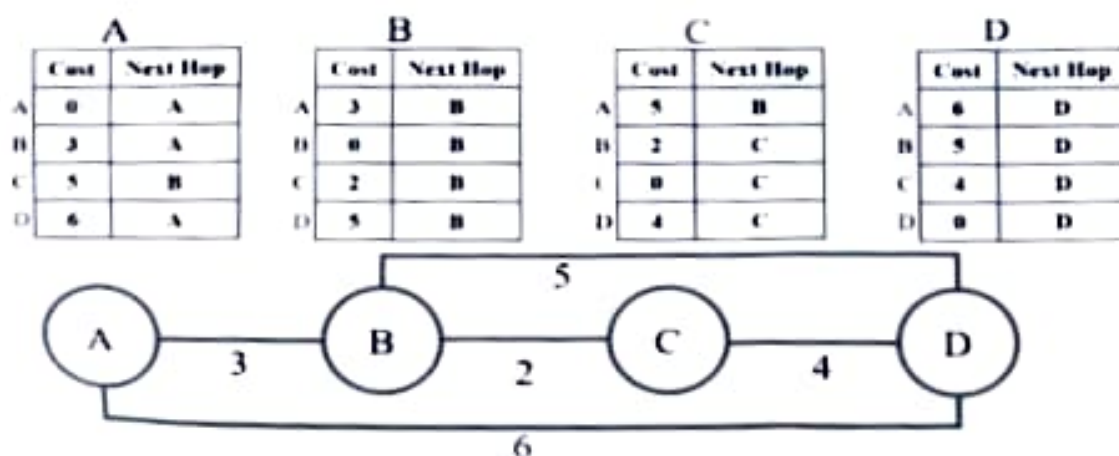07. Consider an IPv4 packet has the following hexadecimal [10]
digits: 0x4500001E0001000007110000B0A130A120D1B06

i. How many bytes of data are being carried by this packet? [2 Marks]

ii. How many hops are possible to the reach the destination? [2 Marks]

iii. 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 [10] 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.

a) Show how this good news is propagated. [4 Marks]

b) Compute the new distance vector for each node after stabilization [6 Marks]

A

	Cost	Next Hop
A	0	A
B	3	A
C	5	B
D	6	A

B

	Cost	Next Hop
A	3	B
B	0	B
C	2	B
D	5	B

C

	Cost	Next Hop
A	5	B
B	2	C
C	0	C
D	4	C

D

	Cost	Next Hop
A	6	D
B	5	D
C	4	D
D	0	D

09. A process in node A is communicating with another process in node B over the internet. Totally [10] 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 [10] 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