

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, April-May 2024
B. Tech. (CSE), Semester VI, 2023-24

Roll No.....

CS1140: COMPUTER NETWORKS

Time: 3 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Mention all the assumptions for your answers clearly.

Q. 1.1	You are a network administrator at a medium-sized company. Recently, some employees have reported issues accessing certain websites and online services. Upon investigation, you suspect that there may be an issue with the IPv4 routing configuration on your network. a) Explain the basic principles of the IPv4 protocol and its role in computer networks. b) Describe the process of IPv4 addressing and subnetting, including how IP addresses are structured and assigned. c) Discuss the importance of IPv4 transition mechanisms and the future of IPv6 in addressing the limitations of IPv4	3.0 (LO3)
Q. 1.2	Given an IP address of 192.168.10.0/24, subnet it into 8 subnets with equal size. Calculate the subnet mask and the range of IP addresses for each subnet.	1.0 (LO3)
Q. 1.3	Consider an IPv4 datagram with a total length of 1500 bytes, which needs to be fragmented due to the Maximum Transmission Unit (MTU) of the outgoing link being 500 bytes. Calculate the fragmentation offset for the second fragment if the first fragment has a length of 500 bytes.	2.0 (LO3)
Q. 2.1	Compare and contrast the TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) protocols in computer networking. In your answer, address the following aspects: a) Basic characteristics and design principles of TCP and UDP. b) Connection-oriented vs. connectionless communication. c) Use cases and scenarios where TCP is preferred over UDP, and vice versa.	3.0 (LO4)
Q. 2.2	Explain the TCP connection establishment mechanism using the three-way handshake process. Describe the sequence of steps involved and the purpose of each step in establishing a reliable connection between a client and a server.	2.0 (LO4)
Q. 2.3	In a TCP connection using the Additive Increase Multiplicative Decrease (AIMD) algorithm, if the current congestion window size (cwnd) is 20 and a timeout occurs, calculate the new cwnd size using the AIMD algorithm parameters.	1.0 (LO4)
Q. 3.1	Explain the concept of virtual circuit switching as an intermediate approach between circuit switching and packet switching. Discuss how virtual circuit	2.0 (LO1)

	switching combines the advantages of both switching techniques and addresses some of their limitations.	
Q. 3.2	You are a network engineer responsible for designing a communication system for a large university campus. The campus requires a robust network infrastructure to support various services, including voice communication, data transfer, and video streaming, for thousands of students and faculty members. Based on the requirements of the university campus, recommend suitable multiplexing techniques for different types of communication services, such as voice communication, data transfer, and video streaming. Justify your recommendations with specific considerations for each service.	3.0 (LO1)
Q. 3.3	Explain 1-persistent CSMA/CD protocol.	1.0 (LO2)

Q. 4.1	A data packet of 1000 bytes is transmitted over a network using a checksum technique for error detection. The data packet consists of the actual data along with a 16-bit checksum appended to the end. The checksum is calculated using the Checksum algorithm, which involves taking the one's complement of the one's complement sum of 16-bit words. Given the following data packet represented in hexadecimal format: Data Packet: 0x4500 003C 1A2E 4000 4006 0000 AC10 0A63 AC10 0AoC Calculate the checksum value to be appended to the end of the data packet using the Internet Checksum algorithm.	3.0 (LO2)
Q. 4.2	Define congestion control in computer networks and explain its significance in ensuring optimal network performance. Discuss the key objectives and challenges associated with congestion control mechanisms. Or Q. 4.2 Compare and contrast the following congestion control techniques: - Open Loop congestion control techniques - Closed Loop congestion control techniques In your answer, address the fundamental principles, advantages, and limitations of each technique.	3.0 (LO3,4)

Q. 5.1	Identify common application layer protocols used in modern network environments, such as HTTP, SMTP, FTP and DNS. For each protocol, explain its purpose, typical usage scenarios, and any relevant advantages or limitations.	4.0 (LO6)
Q. 5.2	Write a short note on ns-3 simulator, with reference to the project assigned to you justify how you used ns-3 simulator for your project work. Or Q. 5.2 Differentiate between public key and private key cryptography with the help of suitable example.	2.0 (LO5)

all the best!