

Term End External Examination 4th Semester (Session- July 2024)

Subject: Computer Applications

Course No and Title: CAPC3423M / Data Communication and Networks

Time: 2.15 hours Max Marks:100 Min. Marks:40

Section A: Objective Type Questions

Q1. Choose the appropriate Answer: (8x1.5=12)

- i. Which OSI layer is responsible for data encryption and decryption?
A Physical Layer B Network Layer
C Transport Layer D Presentation Layer
- ii. In a sliding window protocol, what does the window size determine?
A Number of frames that can be sent before an acknowledgment
B Maximum packet size
C Maximum number of collisions allowed
D Time between retransmissions
- iii. Which of the following is a controlled-access protocol?
A Token-passing B FDMA
C Polling D CSMA/CD
- iv. Selective Repeat protocol differs from Go-Back-N protocol primarily in:
A The size of the sliding window B The acknowledgment mechanism
C The retransmission strategy D The flow control mechanism
- v. Find the class of the following classful IP addresses 130.34.54.12, 200.34.2.1 & 245.34.2.8
A B C A B C B D
C A B C D D A B
- vi. Which metric is used to measure the delay experienced by packets traveling through a network?
A Jitter B Latency
C Throughput D Bandwidth

- vii. Which protocol is used to resolve domain names to IP addresses?
A DNS B HTTP
C FTP D SMTP
- viii. Which of the following fields is unique to UDP and not found in TCP?
A Source port B Destination port
C Sequence number D Length

Section-B: Descriptive Type Questions (Short Type)

Q2: Answer all the Questions (8 x 4 =32)

- i. Define the term "network interface card" (NIC).
- ii. A network link has a bandwidth of 1.0 Gbps. If a single user transfers a file at a rate of 800 Mbps, what percentage of the link's capacity is utilized?
- iii. Define *framing* and give the reason it is needed
- iv. Consider the 5-bit generator $G = 10011$, and suppose that D has the value 10101010. What is the value of R?
- v. List four types of delays in a packet-switched network
- vi. What is an IP address used for?
- vii. What does UDP lack that TCP provides?
- viii. What are the three main components of an email system?

Section – C: Descriptive Type Questions (Medium Type)

Answer all the questions: (4 x 7=28)

- Q3.** How do error detection and correction mechanisms improve reliability in the data link layer?

OR

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A network with bandwidth of 14 Mbps can pass only an average of 19,000 frames per minute with each frame carrying an average of 11,000 bits. What is the throughput of this network?

- Q4.** Explain in detail simplex stop and wait protocol for an error free channel.

OR

Compare and contrast flow control and error control.

- Q5.** Compare and contrast the roles of MAC addresses and IP addresses in data transmission.

OR

Why does the network-layer protocol need to provide packetizing service to the transport layer? Why can't the transport layer send out the segments without encapsulating them in datagrams?

- Q6.** Describe connection oriented and connection less modes of communication. What is the role of transport layer protocols TCP and UDP for establishing such modes?

OR

Explain how HTTP facilitates communication between a web client and server. What are the key features of the protocol?

Section – D: Descriptive Type Questions (Long Type)

Answer any two of the following: (2 x 14=28)

- Q7.** Compare and contrast twisted pairs, coaxial cable, and fiber optics as guided transmission media. Evaluate their respective advantages and disadvantages in terms of bandwidth, attenuation, and susceptibility to interference.
- Q8.** Discuss the principles behind Carrier Sense Multiple Access (CSMA) protocols, including CSMA/CD (Collision Detection) and CSMA/CA (Collision Avoidance). Compare their operation mechanisms and suitability for wired and wireless LANs.

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- Q9.** Provide an overview of the network layer in the TCP/IP model. Discuss the role of IP (Internet Protocol) in addressing and routing packets across interconnected networks. Explain how routers and routing protocols collaborate to ensure end-to-end delivery of data packets.
- Q10.** Explain the significance of the Domain Name System (DNS) in Internet communication. Discuss how DNS resolves domain names to IP addresses and facilitates the exchange of information across the Internet. Provide examples of DNS hierarchy and the role of DNS servers.