



End Term (Odd) Semester Examination November 2025

Roll no.....

230110204

Name of the Course and semester: B.Tech CSE V

Name of the Paper: Computer Networks-1

Paper Code: TCS-514

Maximum Marks: 100

Time: 3 hour

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

(2X10=20 Marks)

Q1.

- a. Discuss Circuit switching and Packet switching with the help of diagrams. Give at least 5 differences among these. Also, explain types of packet switching in brief. CO1
- b. A packet of size 2,000 bytes is sent over three links with transmission rates of 5 Mbps, 10 Mbps, and 20 Mbps. Compute:
i. Transmission delay on each link
ii. Total transmission delay
iii. If propagation delay per link is 5 ms, calculate the end-to-end delay. CO1
- c. Explain the layered architecture of the Internet protocol stack. Describe the functions of each layer and compare it with the OSI reference model. Also discuss why the TCP/IP model became more widely adopted than OSI. CO1

(2X10=20 Marks)

Q2.

- a. Describe DNS Query resolving. State Iterative and Recursive DNS resolving mechanisms with the help of proper diagram and steps. Also state DNS caching concept in brief. CO2
- b. A non-persistent HTTP connection is used to download a web page that includes 1 base HTML file and 6 images. Assume:
i. Each object requires 1 RTT for request-response
ii. TCP connection setup requires 1 RTT
iii. Transmission time is negligible
Calculate the total time required to download the entire page using:
i. Non-persistent HTTP without parallel connections
ii. Persistent HTTP (without and with pipelining) CO2

- c. What is P2P file distribution? In a BitTorrent P2P file distribution, a file of size 400 MB is shared among N = 20 peers.

Given:

- i. Each peer has an upload rate of 2 Mbps
- ii. The original server has an upload rate of 5 Mbps
- iii. Peers upload as soon as they receive pieces
- iv. BitTorrent distributes file pieces in parallel

Using the P2P file distribution, Compute the minimum time required to distribute the file to all peers. CO2



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Q3.

- a. Differentiate between connection-oriented and connectionless services in the Transport Layer.
Discuss how these two approaches affect reliability, ordering, congestion control, and overhead.

(2X10=20 Marks)

CO3

- b. Station A needs to send a message consisting of 9 data packets to station B using a sliding window (window size =3) and Go-Back-N error control strategy. All packets are ready and immediately available for transmission. If every 5th data packet that A transmits gets lost (but no ACKs from B ever get lost), then what is the number of packets that A will transmit for sending message to B.

CO4

- c. Describe in detail the UDP segment structure. Explain the purpose of each field and discuss why UDP includes a checksum even though it is a connectionless protocol. Also state how checksum is used to handle errors.

CO3

Q4.

(2X10=20 Marks)

- a. Explain the process of TCP Connection Establishment and termination using the three-way handshake and four-step connection teardown. Discuss sequence number and acknowledgement number values with the help of an example.

CO3

- b. Consider a Selective Repeat sliding window protocol that uses a frame size of 1KB to send data on a 1.5Mbps link with one-way latency of 50msec. To achieve a link utilization of 60%, find the minimum number of bits required to represent the sequence number field.

CO4

- c. State the TCP Congestion Control Mechanisms in detail:

- i. Slow Start
- ii. Congestion Avoidance
- iii. Congestion Detect

Describe how each stage modifies the congestion window and ensures network stability.

CO4

Q5.

(2X10=20 Marks)

- a. Explain IPv4 Header with the help of suitable diagram. State the significance of fields present in the IPv4 Header structure. Also, compare these to IPv6 Header in brief.

CO5

- b. Given the IPv4 address 172.16.35.200/20, answer the following:

- i. Find the network address of the subnet containing this host.
- ii. Find the broadcast address for this subnet.
- iii. Calculate the number of usable hosts in this /20 subnet.
- iv. Determine the range of usable host addresses for this subnet.

Present the answers in dotted-decimal notation and show how you determine the asked values.

CO5

- c. Answer the followings:

i. Discuss the limitations of Classful addressing and describe how CIDR overcomes these limitations.

ii. State the major steps involved in transitioning from IPv4 to IPv6

CO5