

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2025

B. Tech., Odd Semester, 2025-26

Roll No.....

CS1140: Computer Networks

Time: 2 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.
3. Scientific calculator is allowed.

1. A user starts browsing a webpage hosted at a remote server. The browser opens a single TCP connection to fetch the entire webpage from the server. The webpage consists of a top-level index page with multiple embedded image objects. Assume that all caches (e.g., DNS cache, browser cache) are all initially empty. The following packets leave the user's computer in some order.

- (i) HTTP GET request for an image object
- (ii) DNS request to resolve the web server's name to its IP address
- (iii) HTTP GET request for the index page
- (iv) TCP SYN to open a connection to the web server
- (v) DHCP request

Write the correct chronological order (earliest in time to latest) of the packets leaving the computer.

2(CO 3)

2. Consider the following three socket pairs. For each, determine whether the socket is valid or invalid, and explain the reason. Each socket is represented in the form:

<local IP, local port → remote IP, remote port>

#	Socket Pair
1	179.1.22:80 → 142.250.206.106:443
2	192.179.1.22:443 → 3.233.158.24:80
3	192.179.1.22:57440 → 3.233.158.24:443

2(CO 1)

3. Consider the resolution of the domain name **www.jkl.edu.org.in** by a DNS resolver. Assume that no resource records are cached anywhere across the DNS servers and that iterative query mechanism is used in the resolution. Find the number of DNS query-response pairs involved in completely resolving the domain name.

4(CO 6)

4. Consider a TCP connection operating at a point of time with the congestion window(cnwn) of size 24 MSS (Maximum Segment Size), when a timeout occurs due to packet loss. If all segments transmitted in the next 7 RTTs are acknowledged correctly, what will be the congestion window size (in MSS) during the 8th RTT? Show cnwn vs RTT representation.

4(CO 3,6)

5. Consider an IP packet with a length of 4,500 bytes that includes a 20-byte IPv4 header and a 40-byte TCP header. The packet is forwarded to an IPv4 router that supports a Maximum Transmission Unit (MTU) of 600 bytes. Assume that the length of the IP header in all the outgoing fragments of this packet is 20 bytes. Assume that the fragmentation offset value stored in the first fragment is 0. Find number of fragments, last fragment offset and the last fragment length.

4(CO 2)

6. Three networks are connected to **Router R0**, and R0 is connected upstream to **Router R1**. Router **R1** wants to advertise a single **supernet** route instead of three individual routes.

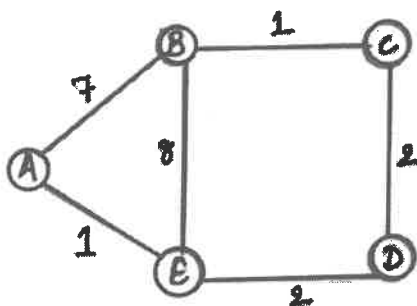
The three subnets connected to R0 are:

Subnet Name	Network Address
Vaishali Nagar	192.168.32.0/24
Man Sarovar	192.168.33.0/24
Chitrakoot	192.168.34.0/23

Check whether the above three networks satisfy the rules for supernetting. If satisfy, then compute the supernet address and mask that Router R1 can advertise in place of the three specific routes.

4(CO 1,4)

7. Consider the following network of routers



- (i) Determine which link(s) in the above network will never be used for carrying any data after **Distance Vector routing** converges(show two iterations of convergence).
- (ii) Now the cost of the link **B-E** is reduced from **8 to 6**. Which link(s) remain(s) unused after convergence.

5(CO 1,5)

8. ISRO has built a series of satellites to orbit the Earth, except they lack the requisite knowledge to design a communication protocol. They task you with designing a reliable, sliding window, byte stream protocol similar to TCP for communication over a link with a bandwidth of 1 Gbps, an RTT of 384 ms, and a maximum segment lifetime of 15 sec. The protocol will not include a window scaling option. How many bits wide should you make the Advertised Window and Sequence number fields?

5(CO 3,6)

*****END*****