DELHI TECHNOLOGICAL UNIVERSITY

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Department of CSE

Assignment No. 1

Subject: Computer Networks **Subject Code: CS208**

Class: B.Tech-IV Semester/Elective

Last Date for Submission: February 25, 2026

Q1. Differentiate between the following:

(a.) Subnetting vs Supernetting (CO2)
(b) FDM vs TDM (CO1)
(c) Switch vs Router (CO1)
(d) Circuit switching vs Packet switching (CO1)
(e) Baseband vs Broadband Transmission (CO1)
(f) BOOTP vs DHCP (CO2)
(g) Routing vs Forwarding (CO1)
(h) CRC vs Checksum (CO2)
(i) ARP vs RARP (CO2)
(j) Synchronous vs Asynchronous Transmission (CO1)
(k) Stop and Wait vs Sliding Window(CO2)
(l) Bit rate vs Baud rate vs Bit Interval (CO1)

Q2. An organization has multiple departments located on different floors of a building. Each department has its own local network and requires secure inter-department communication, efficient data forwarding, scalability, and Internet access (CO1)

(a.) Suggest a suitable network topology or combination of topologies for this scenario.
(b.) Identify the network devices required and briefly justify their roles.

Q3. What is the length of a bit in a channel with a propagation speed of (2 \times 10^8) m/s if the channel bandwidth is: (CO1)

(a) 2 Mbps (b) 20 Mbps (c) 300 Mbps

Q4. Compare the OSI model and TCP/IP model with respect to the number of layers and functionality. (CO1)

Q5. Perform Hamming Code error detection and correction for the following data: (CO2)
Data bits = 101101

(a.) Determine the number of redundant bits required
(b.) Construct the Hamming code
(c.) If the received codeword is 101001101, identify the error position and correct it

Q6. A college campus has multiple buildings: academic blocks, library, hostels, and administrative offices. (CO1)

(a.) What topology or combination of topologies would you recommend?
(b.) Justify your choice based on scalability and fault tolerance

Q7. A communication channel has a bandwidth of 1 MHz and a signal-to-noise ratio of 30 dB.

(a.) Calculate the maximum data rate using Shannon's capacity formula
(b.) Compare this result with the data rate obtained using Nyquist's formula assuming a noiseless channel (Assume binary signalling) (CO1)

Q8. The address of a Class B host is to be split into subnets with a 6-bit subnet number. What is the maximum number of subnets and the maximum number of hosts in each subnet? (CO2)

Q9. A message of 5 MB is to be transmitted over a network. Each packet has a header of 40 bytes and payload of 1000 bytes. The link data rate is 10 Mbps.
Find:

(a.) Number of packets
(b.) Total transmission time (ignore propagation and queuing delay) (CO2)

Q10. Host A is sending data to Host B over a full-duplex link using the sliding window protocol. Sender and receiver window sizes are 5 packets each.
Data packet size = 1000 bytes, transmission time = 50 μs, propagation delay = 200 μs.
What is the maximum achievable throughput? (CO2)

Q11. A digital signal is transmitted using Manchester encoding at a data rate of 10 Mbps.

(a.) Calculate the signal rate (baud rate)
(b.) Estimate the minimum bandwidth required (CO1)

Q12. Host X (192.168.1.97) is connected through two routers R1 and R2 to Host Y (192.168.1.80). Given router IPs and netmask 255.255.255.224, determine how many distinct subnets are guaranteed to already exist in the network. (CO2)

Q13. Given the following network graph, apply Dijkstra's algorithm to find the shortest path from node A to all other nodes (CO1)

Edge	Cost
A – B	6
A – D	1
B – D	2
B – C	5
D – C	1
C – E	3
D – E	7

Q14. In a Go-Back-N protocol, the sender window size is **7** and the sequence number field is **3** bits.(CO2)
(a) Find the maximum window size allowed
(b) Check whether the given window size is valid

Q15. A router receives the following link-state information. Construct the shortest path tree rooted at A. (CO1)

Link	Cost
A – B	4
A – C	2
B – C	1
B – D	5
C – D	8

Q16. Perform CRC error detection for the following: (CO2)

Data = 110101
Divisor = 1011

Q17. In a Slotted ALOHA network, 200 nodes are contending for the channel. If each node transmits with probability p = 0.01, calculate the probability of:

(a) Successful transmission
(b) Collision

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