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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

B.Tech-VI Semester (CSE/IT/BT/ECE/CE)

COURSE CODE (CREDITS): 18B11CI611 (3) MAX MARKS: 25

COURSE NAME: Computer Networks

COURSE INSTRUCTORS: HRI/NTS/GVN/SRJ MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

Q.No	Question	CO	Marks
Q1	What is the maximum sliding window size in the Selective-Repeat ARQ flow control protocol if 'm' denotes the number of bits used to represent the unique frame numbers?	CO2	[2]
Q2	A high-speed full-duplex communication link operates at a bandwidth of 5 Mbps. Data frames of size 1250 bytes are transmitted between two nodes separated by a distance of 5000 km. The signal propagation speed is 2 × 10^8 m/s. The system initially uses the Stop-and-Wait protocol, but due to poor performance, it is later upgraded to a Sliding Window protocol. (a) Compute the efficiency of the Stop-and-Wait protocol. (b) Determine the number of frames that can be in transit simultaneously during one cycle time. (c) Find the minimum sender window size required for full utilization and the corresponding minimum number of sequence number bits.	CO2	[3]
Q3	(A) In a slotted ALOHA system, frames are transmitted in time slots of equal duration. Suppose the average number of transmission attempts per slot is G = 0.8. (a) Calculate the throughput (S) of the system. (b). If each frame is 500 bytes, calculate the average successful data transmitted per slot (in bytes). (B) A CSMA/CD network operates at a data rate of 10 Mbps. The maximum propagation delay between two stations is 25 μs. (a) Calculate the minimum frame size (in bits and bytes) required for proper collision detection. (b) If a frame of this minimum size is transmitted, how long does it take to transmit the frame?	CO2	[2+2=4]

Q4	Draw a neat and clean flow diagram of CSMA/CD Access Control Protocol.	CO2	[2]
Q5	An organization is granted a block of addresses with the beginning address 15.25.75.0/24. The organization needs to have 3 subblocks of addresses to use in its three subnets: one subblock of 30 addresses, one subblock of 62 addresses, and one subblock of 125 addresses. Design the subblocks and explain the process in detail.	CO3	[4]
Q6	Discuss impact of using both IP addresses and port addresses in the Network Address Translation (NAT).	CO3	[3]
Q7	An IP datagram of size 3000 bytes (including 20-byte header) is transmitted over a network with an MTU of 1000 bytes. (a) How many fragments will be created? (b) What will be the Fragment Offset values of each fragment? (c) What will be the MF (More Fragments) bit for each fragment?	CO3	[3]
Q8	Consider a network with five routers A, B, C, D, and E. The link costs are: A–B = 2, A–C = 5, B–C = 1, B–D = 2, C–D = 3, C–E = 1, and D–E = 2 The routers use Distance Vector Routing. Answer the following. (a) Compute the shortest distance from router A to E using the Bellman-Ford approach. Show the calculation. (b) Suppose the link between C and E fails. Explain how the count-to-infinity problem occurs. Illustrate routing table updates for at least two iterations.	CO3	[4]