JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-2 EXAMINATION (April 2022)
B-Tech (6th SEM)

Course Code: 18B11CI611   Max. Marks: 25

Course Name: COMPUTER NETWORKS

Course Credit: 3   Max. Time: 1 Hour 30 Min

Note: All questions are compulsory

Q. No. 1   (a) Using 5-bit sequence numbers, what is the maximum size of the send and receive windows for each of the following protocols?   **[2, 3]** **[CO-2]**
       a. Stop-and-Wait ARQ   b. Go-Back-NARQ   c. Selective-Repeat ARQ

   (b) A system uses the *Go-back-N* ARQ Protocol with a window size of 7. If each packet carries 1000 bits of data, how long does it take to send 1 million bits of data if the distance between the sender and receiver is 5000 Km and the propagation speed is 2×10^8 m? Ignore transmission, waiting, and processing delays. We assume no data or control frame is lost or damaged.

Q. No. 2   (a) Compare and contrast the Go-Back-NARQ Protocol with Selective-Repeat ARQ with a suitable illustration?   **[2, 3]** **[CO-3]**

   (b) Design a bidirectional algorithm for the Stop-and-Wait ARQ Protocol using piggybacking. Note that both parties need to use the same algorithm.

Q. No. 3   Consider the use of Hamming codes to send 11-bit messages. Specifically, consider the message 10011011011. First, calculate the Hamming codeword for this message. Second, invert one message bit in that Hamming codeword (to represent a 1-bit error) and show how the recipient can use the check bits to correct the inverted bit.   **[5]** **[CO-1,2]**

Q. No. 4   (a) One hundred stations on a pure sloted ALOHA network share a 1-Mbps channel. If frames are 1000 bits long, find the throughput if each station is sending 10 frames per second.   **[2, 3]** **[CO-3]**

   (b) In a *CDMA/CD* network with a data rate of 10 Mbps, the maximum distance between any station pair is found to be 2500 m for the correct operation of the collision detection process. What should be the maximum distance if we increase the data rate to 100 Mbps? To 1 Gbps? To 10 Gbps?

Q. No. 5   (a) An organization is granted the block 16.0.0.0/8. The administrator wants to create 500 fixed-length subnets.   **[2, 3]** **[CO-4]**
       a. Find the subnet mask.
       b. Find the number of addresses in each subnet.
       c. Find the first and last addresses in subnet 1.
       d. Find the first and last addresses in subnet 500.

   (b) An ISP is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 100 organizations with each organization receiving just eight addresses. Design the subblocks and give the slash notation for each subblock. Find out how many addresses are still available after these allocations.