

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COMPUTER NETWORKS

CODE: CIC-307

Last Date of Submission: 29th September 2023

ASSIGNMENT-1

Q.1 Calculate the minimum bandwidth (in Hz) required for a digital signal that uses 8-level amplitude modulation to transmit data at 10 Mbps. Assume a signal-to-noise ratio (SNR) of 30 dB. [CO4]

Q.2 Compare space-division, time-division, and space-time division circuit switching techniques in terms of resource utilization and scalability. [CO2]

Q.3 Design a comprehensive network architecture for a large university campus, including addressing, transmission media choices, and switching technologies. Justify your design decisions based on the specific requirements of a university environment. [CO3]

Q.4 A noiseless 4-kHz channel is sampled every 1 msec. What is the maximum data rate? How does the maximum data rate change if the channel is noisy, with a signal-to-noise ratio of 30 dB? [CO4]

Q.5 A sliding window protocol is implemented over a noisy channel. If the sender's window size is 4 and the receiver's window size is 5, calculate the maximum number of unacknowledged frames that can be in transit without causing a deadlock. [CO4]

Q.6 A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted. Suppose that the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end. Give an example of bit errors in the bit string transmitted that will not be detected by the receiver. [CO4]

Q.7 You are given a data stream "110101101" and suspect it might contain errors. Implement a CRC-16 error detection scheme for this data stream and provide the resulting codeword. Show all steps in your calculation. [CO4]

Q.8 Given a data transmission rate of 1 Mbps and a propagation delay of 50 ms, calculate the minimum frame size for efficient flow control using the Stop-and-Wait ARQ protocol. Assume a link efficiency of 70%. Show your calculations. [CO4]