

**INDIAN INSTITUTE OF INFORMATION TECHNOLOGY MANIPUR**

**Assessment I, August-2023**

**B.Tech Fifth Semester-CS**

**Course Name: Data Communication**

**Date: 23/08/2023**

**Duration: 1 hours**

**Course Code: CS-303**

**Time: 09:00 am – 10.00 am**

**Max. Marks: 25**

**Part A**

**(Short Answer Type Questions)**

1. Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital-to-analog conversion? [2]
  - a. PSK
  - b. QAM
2. Distinguish between data rate and signal rate. [2]
3. A channel can transmit signals in the frequency range of 2 MHz to 4 MHz. compute its bandwidth. Assuming  $SNR_{dB}=30$ , what will be the theoretical maximum capacity of this channel? [2]
4. What is the channel capacity for a teleprinter channel with 300 Hz bandwidth and a signal-to-noise ratio of 3 dB, where the noise is white thermal noise? [2]
5. Distinguish between half-duplex and full-duplex operations. [2]

**Part B**

**(Long Answer Type Questions)**

6. Find the NRZ-I, Bipolar-AMI, Pseudoternary, Manchester and Differential Manchester encoding for the binary data 100110111. [5]
- 7a. Define Nyquist bandwidth and Shannon capacity formula. [5]

OR
- 7b. Explain the two scrambling techniques of B8ZS and HDB3. [5]
- 8a. Explain the QPSK modulation scheme with proper diagram. [5]

OR
- 8b. Explain the Quadrature Amplitude modulation with proper diagram. [5]