**Rajasthan Institute of Engineering &Technology, Jaipur.**

**II Mid-Term examination**

**3rd Year, VI Semester**

**Dept. of Electronics & Communication Engineering**

**Digital Communication (6EC2A)**

**SET A**

**Answer all the questions. Each questions carry equal marks.**

Q1. Explain the error probability of BFSK by deriving its mathematical analysis?

Or

Q1. A continuous signal is band limited to 5 KHz. The signal is quantized in 8 levels of a PCM system with the probability 0.25, 0.2, 0.2, 0.1, 0.1, 0.05, 0.05 and 0.05. Calculate the entropy and the rate of information.

Q2. Explain and draw block diagram of transmitter & receiver of BPSK.

Or

Q2. Define and Explain coding & decoding of information?

Q3. What do you mean by orthogonalization? Explain it with an example.

Or

Q3. Consider the case of a communication channel that is noise free. Compute the highest signal rate of the channel having bandwidth of 3100Hz for

1. Bit Rate
2. Each signal element representing 2 bit data
3. Each signal element representing 4 bit data

Q4. Show that the channel capacity of an ideal AWGN channel with infinite bandwidth is given by

C$\infty $ = $\frac{1}{Ln2} .\frac{S}{η}=1.44 \frac{S}{η}$

Where S is the average signal power and $\frac{η}{2}$ is the power spectral density (PSD) of white gaussian noise.

Or

Q4. The generator matrix for a (6,3) block code is given below. Find all the code vectors of this code.

$$\left[\begin{matrix}1 &0&0\\0&1&0\\0&0&1\end{matrix} \begin{matrix}0&1&1\\1&0&1\\1&1&0\end{matrix}\right]$$

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**SET B**

**Answer all the questions. Each questions carry equal marks.**

Q1. Derive geometric interpretation of signal using mathematical analysis.

Or

Q1. What are the advantages and disadvantages of MSK modulation as compared to QPSK modulation?

Q2. Explain and draw block diagram of transmitter & receiver of BFSK.

Or

Q2. A voice communication channel has a bandwidth of 3.1 kHz (300Hz – 3400 Hz) and SNR as 30 dB. Calculate the maximum channel capacity.

Q3. Write short notes on: QPSK.

Or

Q3.Given an AWGN channel with 4kHz bandwidth and the noise power spectral density $\frac{η}{2}$ = 10-12 W/Hz. The signal power required at the receiver is 0.1 mW. Calculate the capacity of this channel.

Q4. An 8-PSK system is operating at 10Mbps with a carrier to noise power ratio of 11.7 dB. The bit error probability is 10-7 for a minimum Eb/N0 ratio of 14.7dB. Determine the minimum bandwidth required to achieve the bit error rate of 10-7.

Or

Q4. Consider the signals S1(t), S2(t), S3(t) and S4(t) (as shown in bellow drawn figures) . We wish to use the Gram – Schmidt orthogonalization procedure to find an orthonormal basis for this set of signals.