

Exam.Code:0930

Sub. Code: 6606

2023

B.E. (Electronics and Communication Engineering)

Sixth Semester

EC-603: Digital Communication

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

- I. Attempt the following:-
- What are performance parameters for digital modulation schemes?
 - What is non coherent detection?
 - What is ISI?
 - What is Entropy? State the condition for the maximum value of the Entropy.
 - What is the difference between slow and fast frequency hopping? (5x2)

UNIT - I

- II. a) What is Gram-Schmidt Orthogonalization procedure? Explain it with the help of suitable example.
- b) Derive an expression for Probability of Error for BPSK modulation scheme. (2x5)
- III. a) Draw the state diagram, tree diagram, and trellis diagram for the constraint length $K=3$, code rate as $\frac{1}{2}$, generated by:
- $$g_1(X) = 1 + X^2$$
- $$g_2(X) = 1 + X$$
- b) What is Viterbi algorithm? Explain it with the help of convolution code as mentioned in question no III (a). (2x5)
- IV. a) What is Shannon's limit? Explain the significance of Shannon's limit in digital communication?
- b) What is CP-FSK? Explain its modulation & demodulation schemes. (2x5)

P.T.O.

UNIT - II

- V. a) What is Direct Sequence Spread Spectrum system? Explain its modulation process with the help of suitable waveforms/diagrams.
- b) How synchronization is achieved in Direct Sequence spread spectrum systems? Which technique performs better in achieving synchronization? (2x5)
- VI. a) What is multiple access communication? Explain multiple access communication architecture.
- b) A group of three stations share a 56-kbps pure Aloha channel. The average bit rate transmitted from each of the three station is $R_1 = 7.5$ kbps, $R_2 = 10$ kbps, and $R_3 = 20$ kbps. The size of each packet is 100 bits/packet. Find the normalized total traffic on the channel, the normalized throughput, the probability of successful transmission, and the arrival rate of successful packets. Assume that the arrival process is Poisson. (2x5)
- VII. a) Explain signal design for band-limited channels for Zero ISI.
- b) Compare the system bandwidth requirements for a terrestrial 3-kHz analog telephone voice channel with that of a digital one. For the digital channel, the voice is formatted as a PCM bit stream, where the sampling rate for the analog-to-digital (A/D) conversion is 8000 samples/s and each voice sample is quantized to one of 256 levels. The bit stream is then transmitted using a PCM waveform and received with zero ISI. (2x5)