

Exam.Code:0930  
Sub. Code: 6919

2062  
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. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

1. Attempt the following:-

- Why BPSK and QPSK manifest the same Probability of error?
- What are the main differences between coherent and non coherent detection?
- What is Phase Locked Loop?
- What is Entropy? State the condition for the maximum value of the Entropy.
- What is slow and fast frequency hopping? (5x2)

**UNIT - I**

- What is Gram-Schmidt Orthogonalization procedure? Explain with suitable examples.
  - Derive an expression for Probability of Error for FSK modulation scheme. (2x5)
- Draw the state diagram, tree diagram, and trellis diagram for the constraint length  $K=3$ , rate code as  $\frac{1}{2}$  generated by:

$$g_1(X) = 1 + X + X^2$$

$$g_2(X) = 1 + X$$

- What is Viterbi algorithm? Explain it with suitable example. (2x5)
- What is Shannon's limit? Explain the significance of Shannon's limit in digital communication?
    - What is QAM? Explain its modulation & demodulation schemes. (2x5)

P.T.O.

(2)

UNIT - II

- 5.(a) What is Direct Sequence Spread Spectrum system? Explain its modulation process with suitable waveforms/diagrams. (5)
- (b) How synchronization is achieved in Direct Sequence spread spectrum systems? Which technique performs better in achieving synchronization? (5)
6. (a) What is multiple access communication? Explain multiple access communication architecture. (5)
- (b) A group of slotted-ALOHA stations generate a total of 120 requests per second including both original and retransmissions. Each request is for a 12.5 ms duration slot. Find
- (i) The normalized total traffic on the channel.
  - (ii) The Probability of a successful transmission on the first attempt.
  - (iii) The Probability of exactly two collisions before a successful transmission. (1.5+1.5+2)
7. (a) What is Inter Symbol Interference ? Explain the types of error performance degradation in baseband transmission? (5)
- (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. (5)