

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

B E Sem-VI Examination May 2011

Subject code: 161001

Subject Name: Digital Communication

Date: 16/05/2011

Time: 10.30 am – 01.00 pm

Total Marks: 70

### Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Answer the following questions **07**
- [1] What is the difference between deterministic signal and random signal?
  - [2] What is the relationship between probability and information?
  - [3] Two dice are thrown; find out probability that sum of numbers showing on two dice is 5.
  - [4] Explain conditional probability with suitable example
  - [5] Speech signal is sampled at 8000 samples per second, coded with 8 bit per sample. Find out data transmission rate required to transmit the speech signal.
  - [6] Audio signal is sampled at 44,100 samples per second and coded with 16 bit per sample. Find out storage requirements in bytes to record 1 hour of digital audio signal
  - [7] What is the Nyquist bandwidth if telephone quality speech signal 300Hz to 3.4 KHz is coded by PCM using 128 levels?
- (b)** What is source coding? Explain Huffman Coding with appropriate example **07**
- Q.2 (a)** What is scrambling? Explain scrambling and unscrambling process with block diagram and example. **07**
- (b)** What is pulse shaping? Why pulse shaping is done? Explain pulse shaping by traversal filter **07**
- OR**
- (b)** Discuss Shannon's channel capacity theorem. Discuss channel capacity for infinite bandwidth. Show that channel capacity is always finite for finite signal and noise power. **07**
- Q.3 (a)** Draw and explain block diagram of pulse code modulation system. What is the effect of under-sampling? **07**
- (b)** Draw and explain block diagram of ADPCM system. Compare PCM and ADPCM. **07**
- OR**
- Q.3 (a)** Explain working principle of delta modulation with help of block diagram. What are the problems associated with delta modulation? **07**

- (b) Discuss uniform and non-uniform quantization techniques. What is the advantage of non-uniform quantization? **07**
- Q.4 (a)** What is the difference between linear block code and convolution code? Explain working of convolution coder. Define efficiency of convolution coder. **07**
- (b) Explain Quadrature Phase Shift Keying (QPSK) technique with neat sketches. Draw constellation diagram for QPSK. **07**

**OR**

- Q.4 (a)** What is the difference between coherent and non-coherent detection techniques? Discuss coherent and non-coherent detection of FSK signal **07**
- (b) Define Noise figure. Discuss optimum binary receiver with neat sketches. **07**
- Q.5 (a)** What is spread spectrum system? What are the criteria for spread spectrum system? Draw and explain block diagram of direct sequence spread spectrum (DSSS) system. **07**
- (b) What is line coding? What are the ideal requirements from line coding? Draw waveform of bipolar AMI coding for the sequence 10100101. **07**

**OR**

- Q.5 (a)** What are the different types of spread spectrum systems? Draw and explain block diagram of frequency hopping spread spectrum (FHSS) system. **07**
- (b) Discuss Central limit theorem **07**

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