

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
