

GUJARAT TECHNOLOGICAL UNIVERSITY

BE Sem-VI Summer Exam 2012

Subject code: 161001**Subject Name: Digital Communication****Date: 09/05/2012****Total Marks: 70****Time duration: 10:30am to 1.00pm****Instructions:**

1. **Attempt all questions.**
 2. **Make suitable assumptions wherever necessary.**
 3. **Figures to the right indicate full marks.**
- Q.1** (a) Define random variable and find the mean, the mean square and the variance of the general gaussian random variable. **07**
- (b) In PCM, regenerative repeaters are used to detect pulses (before they are lost in noise) and retransmit new, clean pulses. This combats the accumulation of noise and pulse distortion. A certain PCM channel consists of n identical links in tandem. The pulses are detected at the end of each link and clean new pulses are transmitted over the next link. If P_e is the probability of error in detecting a pulse over any one link, show the P_E , the probability of error in detecting a pulse over the entire channel (over the n links in tandem), is $P_E \simeq n P_e$, $n P_e \ll 1$ **07**
- Q.2** (a) Derive channel capacity C if channel noise is additive, white Gaussian with mean square value N , given signal power S . **07**
- (b) Find the channel capacity of the Binary-Symmetric Channel (BSC). **07**
- OR**
- (b) A zero-memory source emits messages m_1 and m_2 with probabilities 0.8 and 0.2, respectively. Find the optimum (Huffman) binary code for this source as well as for its second - and third - order extension (that is, for $N = 2$ and 3). Determine the code efficiencies in each code. **07**
- Q.3** (a) Derive the general expression for PSD of a large class of line codes. **07**
- (b) Fully explain Delta Modulation with its disadvantages. **07**
- OR**
- Q.3** (a) What is Inter Symbol Interference? Explain the Nyquist's first criteria for zero ISI. **07**
- (b) What are the functions of regenerative repeater? Fully Explain the zero-forcing equalizer with expressions. **07**
- Q.4** (a) Derive the general expression of Bit Error Rate (BER) for Optimum Binary Receiver. **07**
- (b) For ASK modulated signal, derive the expression of bit error probability using non-coherent detection **07**
- OR**
- Q.4** (a) What is the multi-amplitude signaling? Derive the BER for the same using matched-filter receiver. **07**
- (b) Compare polar, bipolar, on-off and orthogonal signaling in term of bit error probability for optimum binary detection. **07**
- Q.5** (a) Write short note on Convolution code. **07**
- (b) Write short not on comparison of coded and uncoded system. **07**
- OR**
- Q.5** (a) Explain the generation of linear block code using suitable example. **07**
- (b) Explain the decoding of cyclic code with suitable example. **07**
