

Seat No.	
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**T. E. (Electronics and Telecommunication Engg.) (Part - II)  
(Semester - VI) Examination, December - 2015**

**DIGITAL COMMUNICATION (Pre - Revised)**

**Sub. Code : 45693**

**Day and Date : Wednesday, 02 - 12 - 2015**

**Total Marks : 100**

**Time : 02.30 p.m. to 05.30 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data if necessary.

**SECTION - I**

**Q1) Solve any two.**

- a) Define Random Process. Also explain classification of Random Processes. [8]
- b) Define Probability. Explain Properties of Probability. Derive expression for conditional probability. [8]
- c) Suppose 10,000 digits are transmitted over a noisy transmission channel having error probability per digit equal to  $5 \times 10^{-5}$ . Estimate the probability of getting two digits in errors. Use the poisson's distribution. [8]

**Q2) Solve any two.**

- a) Prove relationship between conditional and joint entropy. [8]
- b) Explain types of channels and their models. [8]
- c) Consider the five source symbols (messages) of a discrete memoryless source and their probabilities are shown below. [8]

Message	:	$M_1$	$M_2$	$M_3$	$M_4$	$M_5$
Probability	:	0.4	0.2	0.2	0.1	0.1

Follow the Huffman's algorithm to find the code words for each message. Also find the average codeword length and the average information per message.

Assume  $M = 2$ .

**P.T.O.**

Q3) Solve any two.

- a) Explain companding in PCM. [9]
- b) Explain with block diagram DPCM transmitter and receiver. [9]
- c) In a PCM system using N-bit encoder, show that signal to quantization noise ratio is given as  $[1.8 + 6N]$  dB for sine wave input. [9]

**SECTION - II**

Q4) Solve any two.

- a) Explain with block diagram BASK transmitter and receiver. [8]
- b) Compare ASK, FSK and PSK. [8]
- c) Explain coding format of [8]
- i) Bipolar RZ
  - ii) Bipolar NRZ
  - iii) Unipolar NRZ
  - iv) Unipolar RZ

Q5) Solve any two.

- a) Explain with block diagram Early-late bit synchronizer. [8]
- b) Explain Eye diagram. Also explain ISI. [8]
- c) What is equalization? Draw and explain Adaptive equalizer for data transmission. [8]

Q6) Solve any two.

- a) Explain linearity and cyclic property of cyclic code. [9]
- b) Consider a (7, 4) linear block code whose generator matrix is given by [9]

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

- Find i) All the codewords.  
ii) Parity check matrix.

- c) For the convolutional encoder shown below, Find the encoder output for the bit sequence 11011011 using code Tree. [9]

