SEAT NO. _____

GANPAT UNIVERSITY

B.Tech. Semester VI (EC) Examination (Regular) May-June 2012

EC 604: Digital Communication and Information Theory

MAX Time: 3 Hours **MAX Marks: 70**

Instructions:

1. Attempt all questions.
2. Answer **each** section in **separate** answer books.
3. Figures to the right indicate **full** marks.
4. Standard terms and notations are used. **Assume** data, if necessary.

SECTION-I

1 A A source generates eight symbols with probabilities 0.4, 0.25, 0.15, 0.10, 0.05, 0.03, 0.01 and 0.01. encode the symbol using Huffman coding and find the entropy and average length of the source. Also find the entropy if all symbols are equiprobable. 8

B Write short note on variable length coding. 4

OR

1 A State and prove the properties of mutual information. 6

B Give reasons for the following. 6

i. Hamming code can correct t errors but can detect t+1 errors.
ii. Huffman coding is also called optimum coding.
iii. For two random variables X and Y, the entropy of X is always greater or equal to the conditional entropy of X obtained by observing Y.

2 A What is meant by redundancy in a source code? Explain the repetition coding. 3

B A binary communication system has a source with symbol probabilities $P(x_1)=0.55$ and $P(x_2)=0.45$, as shown in the following binary channel. 8

Channel matrix is $P(Y|X) = \begin{bmatrix} 0.6 & 0.4 \\ 0.3 & 0.7 \end{bmatrix}$.

Find the following: H(Y), H(X,Y), H(Y|X) and Channel Capacity.

OR

2 A Using the polynomial $g(x) = 1 + x + x^3$, construct the generator matrix for Hamming code and find all the possible code words. 8

B Construct the syndrome table using the generator matrix of section A. 3

3 A Using suitable example explain the rate ½ convolutional code. 6

B Construct the code for any (7, 3) cyclic code. 6

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SECTION-II

4	A	What is companding? Explain non uniform Quantization. How is it different from uniform quantization?	6
	B	What kind of properties line code should have for digital communication? Explain.	6
		OR	
4	A	What is oversampling? Explain analysis of DPCM in digital communication.	6
	B	Explain regenerative repeater with the help of diagram. How is it different from an amplifier?	6
5	A	What do you mean by M-ary communication? Draw MPSK signals.	3
	B	Write short notes on coherent detector and its importance.	4
	C	Why are we interested in Euclidean distances between signals?	4
		OR	
5	A	Explain Nyquist criterions.	5
	B	Explain decision regions in BPSK and QPSK.	6
6	A	What is antialising filter? Explain.	4
	B	Why sinc pulse is not suitable as far as Nyquist criterion for zero ISI is concern?	5
	C	Compare ASK and PSK in digital communication using CRO and Spectrum analyzer.	3

END OF PAPER