Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. IST Semester–Remedial Examination – July- 2011

Subject code: 712703N

Subject Name: Information Theory and Coding

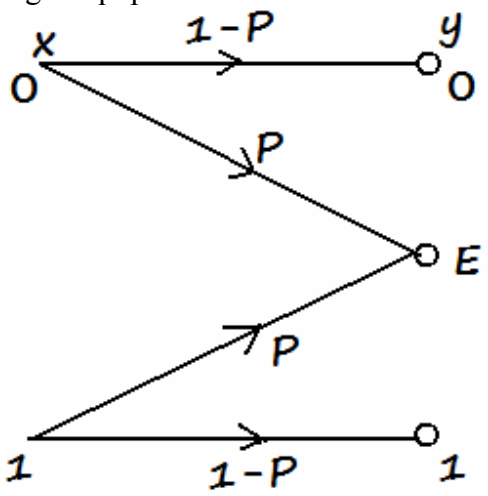
Date:11/07/2011 **Time: 10:30 am – 01:00 pm**

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)** For binary erasure channel (BEC) the data in error is erased. Hence, there is an error probability p, but the probability of error is zero, shown in fig. Determine H(x), H(x/y), and I(x; y) assuming the two transmitted messages equiprobable. **07**



(b) For memory less source and equiprobable message **07**

(i) Define entropy of a source and find the maximum entropy. Give reason why H(m) for memory less source > H(m) when source is not memory less. (5 marks)

(ii) Is it possible to find any uniquely decodable code whose average length is less than H(m)? why? (2 marks)

Q.2 **(a)** Consider a generator matrix G for a nonsystematic (6, 3) code: **07**

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

Construct the code for this G, and show that dmin the minimum distance between code words is 3. Consequently, this code can correct at least one error.

(b) For the Band Limited AWGN Channel, both the signal x(t) and the noise n(t) are band-limited to B Hz and the samples taken at the uniform rate of 2B samples per second. Find the I(x; y) and prove that C= B log (1+S/N). **07**

OR

(b) Explain compact code with any example. **07**

Q.3	**(a)**	Explain viterbi's algorithm with suitable example.	**07**
	(b)	Give comparison of coded and uncoded system.	**07**
		OR	
Q.3	**(a)**	Explain sequential decoding.	**07**
	(b)	Construct a single error correcting (7,4) linear block code (Hamming code) and the corresponding decoding table.	**07**
Q.4	**(a)**	Explain LZ code.	**07**
	(b)	Explain Shannon–Fano coding.	**07**
		OR	
Q.4	**(a)**	Give the types of arithmetic coding and explain any one.	**07**
	(b)	Explain Krafts inequality theorem with example.	**07**
Q.5	**(a)**	Explain JPEG standard for image compression.	**07**
	(b)	Explain DES algorithm.	**07**
		OR	
Q.5	**(a)**	Explain Loss less data compression. Where it is used give the example.	**07**
	(b)	Define Cryptography, Encryption and Decryption. Give differences between public key and private key encryption.	**07**

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