Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 710203N **Date: 12-01-2013**

Subject Name: Information Theory & Coding

Time: 02.30 pm – 05.00 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)**	Explain three definitions of probability. Explain the cumulative distribution function and probability distribution function with their properties.	**07**
	(b)	What is uniquely decodable code? Check which codes are uniquely decodable and instaneous? S1={101,11,00,01,100} S2={0,10,110,1110,…..} S3={02,12,20,21,120}	**07**
Q.2	**(a)**	What is mean square continuity? What is a convolution code? Mention its structural properties? Mentions the areas of applications of coding.	**07**
	(b)	What is central limit theorem? Explain Raleigh density with diagram.	**07**
		OR	
	(b)	X and Y are independent standard normal random variables. Find the PDF of Z=X+Y.	**07**
Q.3	**(a)**	Explain classification of a random process. Explain wide sense stationary process in detail. Mention the importance of erogodicity.	**07**
	(b)	What is entropy? Find the relationship between hartely, nats and bits. Explain kraft's in-equality theorem with proof.	**07**
		OR	
Q.3	**(a)**	Wiener process does not have a mean square derivative at any point. Justify this statement with detailed explanation.	**07**
	(b)	Explain Shanon-Fano code in detail with example. Mention its advantages over other coding schemes.	**07**
Q.4	**(a)**	Explain coding and decoding techniques for cyclic codes in detail with diagram.	**07**
	(b)	Explain Cryptography and information security. Explain power spectral density.	**07**
		OR	
Q.4	**(a)**	Explain Hamming code in detail.	**07**
Q.4	**(b)**	Write a short not on storage and transmission of text, audio and video. Classify the markov sources.	**07**
Q.5	**(a)**	A communication system accepts positive voltage V as a input and outputs a voltage Y= r V + N where r = 1/100 and N is Gaussian noise RV with mean = 0 and variance = 4. Find the value of V that gives P[Y<0]=0.000001	**07**
	(b)	Explain Huffman Coding technique in detail.	**07**
		OR	
Q.5	**(a)**	Let Z be random variable with PDF f(Z)= 0.5 for range -1 to +1. Let the RV X=Z and Y= Z^2. Verify this relation for correlation and statically independence.	**07**
	(b)	Explain arithmetic coding technique in detail with example.	**07**

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