Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 712703N **Date: 03-01-2014**

Subject Name: Information Theory and Coding

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)** State and prove the Mcmillan's theorem **07**

(b) What is entropy of source? Consider a discrete memory less source with source alphabet S = {s1, s2, s3} with probabilities p(s1) = ¼ , p(s2) = ¼, p(s3) = ½. Find entropy of the source. **07**

Q.2 **(a)** For zero memory sources emit six messages with following probabilities. Find 4-ary Huffman code. Determine average word length, efficiency and redundancy. **07**

Messages	M1	M2	M3	M4	M5	M6
Original source probabilities	0.3	025	0.15	0.12	0.10	0.08

(b) Explain arithmetic coding. **07**

OR

(b) Explain error free communication over noisy channel **07**

Q.3 **(a)** How convolution code differ from block code? Explain construction of convolution code with example. **07**

(b) State and derive the Hamming bound for the linear block code. Whether golay's code (23,12) satisfy it exactly or not? **07**

OR

Q.3 **(a)** Describe comparison of coded and uncoded system **07**

(b) Describe in brief : (1) Channel capacity (2) Information rate **07**

Q.4 **(a)** Explain Kraft's inequality theorem with example **07**

(b) Explain the viterbi's algorithm in detail with suitable example. **07**

OR

Q.4 **(a)** Differentiate between symmetric and asymmetric key cryptography. **07**

(b) Describe encryption based on large prime numbers **07**

Q.5 **(a)** Define : Cryptosystem, cryptography, Encryption and decryption **07**

(b) Explain data encryption standard algorithm **07**

OR

Q.5 **(a)** Define Compression and write short note on loss less image compression. **07**

(b) State and derive the Hamming bound for the linear block code. **07**

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