

Code: CS3T5

II B.Tech - I Semester – Regular Examinations - December 2014

**INFORMATION THEORY
(COMPUTER SCIENCE & ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

- 1 a) Explain about basic information processing system. 5 M

- b) Define Entropy. A binary source has symbol probabilities $p_0=0.9$, $p_1=0.1$. Find source entropy. 4 M

- c) Write about Arithmetic Coding. 5 M

- 2 a) A discrete memory less source has an alphabet {a, b, c, d} with symbol probabilities 0.2, 0.4, 0.2, 0.2 respectively. Compute the Huffman Code for this source, entropy and the average code word length of the source encoder. 8 M

- b) Explain the following 6 M
 - i) Kraft inequality
 - ii) Optimal Codes

- 3 Explain the following
 - a) Fano's inequality 3 M
 - b) Channel Coding Theorem 7 M
 - c) Hamming Codes 4 M

- 4 a) Write the differences between differential entropy and discrete entropy 7 M
- b) Explain the following 7 M
- i) Joint entropy ii) Conditional entropy
- 5 a) Define Gaussian channel. Explain the coding theorem for Gaussian channels. 7 M
- b) Explain the following 7 M
- i) Band limited channels ii) noisy channel
- 6 a) Write about Hypothesis Testing 7 M
- b) Explain about Lempel-Ziv Coding 7 M
- 7 a) Define Quantization. Explain about various types of quantization. 7 M
- b) What is Rate Distortion Codes and Information Rate Distortion with an example? 7 M
- 8 a) Briefly explain various Gaussian Multiple User Channels. 7 M
- b) Explain the following 7 M
- i) Multiple Access Channel
- ii) Encoding of correlated sources