

Roll No.

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BT-5/D11 : 7709**ECE-305 E : Information Theory & Coding**

Time : Three Hours

Maximum Marks : 100

Note:- Attempt FIVE questions in all, selecting at least ONE question from each of the four units.

UNIT-I

- Q.1. a) Ten passengers get into a train that has three cars. Assuming a random placement of passengers, what is the probability that the first car will contain three of them. 7
- b) Define random variable. Also mention its properties. 6
- c) Explain probability distribution and density functions with examples. 7
- Q.2 a) State and explain central-Limit theorem. 5
- b) Discuss the following: 4+4
(i) Stationary Ergodicity (ii) Markov Processes
- c) Show that if the random variables x , y , and z are jointly normal and independent in pairs, they are independent. 7

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Contd.

UNIT-II

- Q.3. a) Define entropy and discuss its properties. 5
- b) State and explain Shannon's theorem on coding for memory-less noisy channels. 7
- c) Find the channel capacity of a symmetrical binary channel if the received information is always wrong. 8
- Q.4 a) A source has seven elements with probabilities 0.3 0.2 0.15 0.15 0.1 0.06 0.04 respectively. Construct a Huffman code and find their average code length. 10
- b) Discuss the following
i) Noiseless coding
ii) Theorem of Decodability 10

UNIT-III

- Q.5 a) Explain maximum likelihood decoding 6
- b) What are different error control strategies? Discuss those. 8
- c) Write a note on Galois fields. 6
- Q.6 a) Explain error detecting and correcting capabilities of block codes. 10
- b) Discuss the following in brief.
(i) Hamming code (ii) B.C.H. Codes 5+5

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