

BT-5/D07

## INFORMATION THEORY &amp; CODING

Paper-ECE-305-E

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *five* questions, selecting at least *one* from each unit.

## UNIT-I

1. (a) A husband and wife appear in an interview for two vacancies for the same post. The probability of husband's selection is  $1/7$  and that of wife's is  $1/5$ . Find the probability :
- (i) Both of them will be selected.
  - (ii) Only one of them will be selected. 10
- (b) Write notes on :
- (i) Characteristic functions.
  - (ii) Properties of probability density function. 10
2. (a) Explain the classification of Random process.
- (b) Explain :
- (i) Ergodic process.
  - (ii) Properties of Auto Correlation functions. 10

## UNIT-II

3. (a) Given a source with 8 alphabets as shown below :
- |          |     |     |     |     |     |     |     |     |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|
| $X_i$    | A   | B   | C   | D   | E   | F   | G   | H   |
| $P(X_i)$ | .22 | .20 | .18 | .15 | .10 | .08 | .05 | .02 |
- Generate the Huffman code and also calculate the efficiency. 10
- (b) Explain Noiseless coding in detail. 10

4. (a) Discuss entropy, mutual information and their properties.
- (b) Explain :
- (i) Discrete memoryless channels.
  - (ii) BEC channel. 10

### UNIT-III

5. (a) Discuss various types of errors and error control strategies. 10
- (b) What are linear block codes ? Discuss the minimum distance of a block code. 10
6. (a) Explain Cyclic code and its properties. 10
- (b) Discuss in detail Hamming codes. 10

### UNIT-IV

7. (a) What is Berlekamp-Preparata convolution code for burst error correction ? 10
- (b) Explain Vertical-decoding. 10
8. (a) Compare Selective-repeat ARQ and Go-back-N ARQ. 10
- (b) What is hybrid ARQ ? 10