

Roll No.

Total Pages : 03

BT-5/D-18

35007

INFORMATION THEORY AND
CODING
ECE-305E

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) A fair coin is thrown three. Write all possible outcomes and calculate the probability of getting at least one tail. 10
- (b) What is probability density function (pdf) ? Write its basic properties in detail. 10
2. (a) Derive and describe Central Limit Theorem. 10
- (b) What are Linear systems and why they are called linear systems ? Derive the response of memory less system. 10

Unit II

3. (a) Consider a Discrete Memory Less Source with source probabilities $\{0.30, 0.25, 0.20, 0.15, 0.10\}$. Find the source Entropy, $H(X)$. 10
- (b) Prove that the entropy for a discrete source is maximum when the output symbols are equiprobable. 10
4. Consider a DMS with seven possible symbols with probability $\{0.37, 0.33, 0.16, 0.07, 0.04, 0.02, 0.01\}$. Determine the Huffman Code for this source. Compute the efficiency of the code. 20

Unit III

5. Consider the following generator Matrix $G = [1\ 0\ 1\ 0\ 0 ; 1\ 0\ 0\ 1\ 1 ; 0\ 1\ 0\ 1\ 0]$:
- (a) Generate all possible code words 5
- (b) Find the parity check matrix H . 5
- (c) What is minimum distance of this code ? 5
- (d) How many errors can this code correct ? 5
6. What are cyclic codes ? How are they different from Linear Block Codes ? Find all possible cyclic code word for generator polynomial $x + 1$ and verify they are cyclic in nature. 20

Unit IV

7. Discuss in detail with suitable example the Viterbi Decoding of Convolution Codes. 20

8. What do you understand by Error Detection and Correction in Communication System ? Discuss various Hybrid ARQ schemes for error correction. 20

