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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 coine 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 equi-probable. **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**

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