Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: ISE2503 **Course Name:** Information Theory and Coding

Semester: Fifth Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	46	44

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Define conditional entropy.	2	CO1	BT1
2	State any two properties of mutual information.	2	CO1	BT1
3	Differentiate Shannon–Fano coding and Huffman coding.	2	CO2	BT1
4	For P = {0.4,0.3,0.2,0.1}, find the self-information of each symbol.	2	CO1	BT1
5	Define coding efficiency and redundancy.	2	CO2	BT1

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	A source emits symbols with probabilities {0.30,0.25,0.20,0.15,0.10}. Calculate entropy and maximum entropy. Comment on efficiency.	10	CO1	BT1
7	Explain syndrome decoding with a suitable example. Consider a discrete communication channel with 3 inputs and 4 outputs. The incomplete channel matrix of that channel is as given below. Complete the channel matrix and also draw its channel diagram. $P\begin{pmatrix}Y\\X\end{pmatrix} = S\begin{bmatrix}0.5 & 0.2 & * & 0.1\\0.4 & 0.1 & 0.5 & *\\0.3 & * & 0.2 & 0.4\end{bmatrix}$	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Construct a Huffman code for probabilities {0.35,0.25,0.20,0.10,0.10}. Compute average code length.	10	CO2	BT1
9	Construct a Shannon–Fano code for probabilities {0.40,0.20,0.20,0.10,0.10}. Find average code length and coding efficiency.	10	CO2	BT2

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
10	A source emits S0, S1, S2, S3 with probabilities 1/3,1/6,1/4,1/4. Calculate the entropy of the source, efficiency and redundancy.	10	CO1	BT1

PTO (Please Turn Over)

11	a) Explain Shannon's noiseless coding theorem and its implications. b) Describe the Extended Huffman Coding algorithm. Construct an extended Huffman code for a source with symbol probabilities {0.4, 0.3, 0.2, 0.1} considering pairs of symbols.	10	CO1	BT2

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Construct an extended Huffman code for a source with symbol probabilities {0.4, 0.3, 0.2, 0.1} considering pairs of symbols	10	CO2	BT2
13	Explain the compression techniques used in the following standards: JPEG PNG ZIP Highlight the role of entropy coding in each.	10	CO2	BT1