

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

CLASS: BE
BRANCH: CS/IT

SEMESTER: VII
SESSION: MO/2022

SUBJECT: CS429 INFORMATION AND CODING THEORY

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
 2. Candidates attempt for all 25 marks.
 3. Before attempting the question paper, be sure that you have got the correct question paper.
 4. The missing data, if any, may be assumed suitably.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
-

			CO	BL								
Q1 (a)	Explain the importance of measuring entropy in context of Information theory.	[2]	CO-1	Understand								
Q1 (b)	Find self-information of each of the following symbols. Also, calculate total information and entropy of the set. Source alphabet whose letters have the following probabilities.	[3]	CO-2	Apply								
	<table border="0"><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>$\frac{1}{4}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{2}$</td><td>$\frac{1}{8}$</td></tr></table>	A	B	C	D	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{8}$			
A	B	C	D									
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{8}$									
Q2 (a)	Define Discrete Memoryless Channel. Why source coding is often called as noiseless coding?	[2]	CO-1	Understand								
Q2 (b)	Suppose we send words along a symmetric binary channel with symbol error probability (1/3). Can we be able to compute the transition matrix of the channel? If possible, derive that.	[3]	CO-1	Analyse								
Q3 (a)	State Kraft's inequality. Apply Kraft's inequality to ascertain if an Instantaneous code can be created with the following codeword lengths {2, 2, 3, 3, 4}.	[2]	CO-5	Analyse								
Q3 (b)	Discuss the drawbacks of fixed length coding in comparison to other efficient coding techniques.	[3]	CO-2	Understand								
Q4 (a)	Give the logic to generate Huffman code. Point out the merits and demerits of this code.	[2]	CO-2	Understand								
Q4 (b)	Justify the statement - "A code C is instantaneous if and only if it is prefix".	[3]	CO-5	Evaluate								
Q5 (a)	How do you decide a channel is symmetric and error free?	[2]	CO-1	Understand								
Q5 (b)	Suppose you wish to send the result of rolling a fair eight-sided die. Design the most efficient way to encode the message (corresponding to each side). Show the encoded message.	[3]	CO-5	Create								

: : : : : 26/09/2022 : : : : : M