SOMAIYA VIDYAVIHAR UNIVERSITY

27/2/2024

Semester: January 2024- April 2024		
Maximum Marks: 30	**Examination: In-Semester Examination**	**Duration :1hr 15 mins**
Programme code: 04		
Programme: BTech IT	**Class: SY**	**Semester:I (SVU 2020)**
Name of the Constituent College:		
K. J. Somaiya College of Engineering	**Name of the department:** IT	
Course Code: 116U04C402	**Name of the Course: ITC**	

Question No.		Max. Marks
Q1 (a)	Write any four properties of Mutual Information.	(04)
	A PC screen has a resolution of 640x480 pixels. Each pixel has 8 brightness levels, all with equal probability. The screen is refreshed 30 times per second. Calculate the information rate.	(06)
Q2 (a)	Generate the Huffman code for five symbols {s1, s2, s3, s4, s5} with probabilities {2/22, 3/22, 4/22, 6/22 and 7/22}. Show the Huffman tree diagram.	(06)
(b)	In a binary symmetric channel p(x1) = 1/3 and p(x2) = 2/3. Also, p=1/5 and (1-p) = 4/5. Write the conditional probability matrix and the joint probability matrix.	(04)
	---------- OR ----------	---OR---
	A binary symmetric channel has the following channel matrix: $P(Y\|X) = \begin{vmatrix} 3/4 & 1/4 \\ 1/4 & 3/4 \end{vmatrix}$ Also, p(x1) = 2/3, p(x2) = 1/3. Determine H(X), H(Y), H(Y|X), H(X|Y) and H(X,Y) and I(X;Y).	(10)
Q3 (a)	Use LZW method to encode the string "hehehaha" assuming that the following directory entries are already given to you:-	(05)
(b)	Assume that you have 26 symbols (letters A to Z). All symbols have equal probability (i.e. 1/26). Write the steps or pseudo-code or flowchart for a program to encode any 4 letter word using Arithmetic coding.	(05)

0	h
1	e
2	a
3	he
4	ha

1/1