K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

April – May 2023
(B.Tech) Program: Scheme II
Supplementary Exam Examination: TY Semester: V
Course Code: AIC504 and Course Name: Information Theory and Coding

Date of Exam:08/08/2023 Duration: 2.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	How the probability of event relates to the degree of uncertainty and information contents explain with example?	2	CO1	U
ii)	Compare Shannon Fano and Huffman coding	2	CO2	U
iii)	Explain digram coding with example	2	CO3	U
iv)	Illustrate linearity and cyclic property of cyclic codes.	2	CO6	U
v)	Write short note on Code Tree	2	CO6	U
vi)	What is digital image? Explain different types of images.	2	CO4	U
vii)	Write short note on Group of Pictures (GOP)	2	CO4	U
viii)	Explain Frequency masking and Temporal masking	2	CO5	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	Consider four messages Q1 to Q4have probabilities ½, ¼, 1/8, 1/8 a) Calculate self-information of the symbol b) Find the entropy of the message. c) Find the IR if r=1 message. d)What is the rate, when the messages are coded as {00,01,10,11}	4	CO1	Ap
ii)	Compare Huffman code and Arithmetic code.	4	CO2	U
iii)	What is worst case situation of LZ77 explain it with example, How LZ78 solves this problem?	4	CO3	Ap
iv)	The generator polynomial of (7,4) cyclic code is $G(p)=p^3+p+1$.	4	CO6	Ap

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	Find all code vectors for the code in systematic.			
v)	What is JPEG? What are different goals and different modes of operation of JPEG?	4	CO4	U
vi)	What is companding? Explain in details A law compression and μ law companding.	4	CO5	U
Q.3	**Solve any two questions out of three.**	**16**		
i)	A binary communication channel has an error probability P(e). The probability of transmitting the symbol '0' is Q and that of transmitting symbol '1' is 1-Q. a)If receiver detects an incoming signal as '1'. What is the probability that transmitting signal was i) 0 ii) 1 b)If receiver detects an incoming signal as '0'. What is the probability that transmitted signal was i) 0 ii) 1	8	CO1	Ap
ii)	Consider a DMS with seven symbols x, i=1 to 7 and the corresponding probabilities P(x1)=0.46, P(x2)=0.30, P(x3)=0.12, P(x4)=0.06, P(x5)=0.03, P(x6)=0.02, and P(x7)=0.01. Construct Huffman code. Find entropy, average codeword length and efficiency of code for simple and alternate way of Huffman coding	8	CO2	Ap
iii)	Encode the following sequence using LZ78 approach 'wabba#wabba#wabba#wabba#woo#woo'	8	CO3	Ap
Q.4	**Solve any two questions out of three.**	**16**		
i)	Explain H.261 Encoder and Decoder block diagram.	8	CO4	U
ii)	Explain ADPCM encoder and decoder in detail.	8	CO5	U
iii)	A rate 1/3 convolutional coder with constraint length of '3' uses the generating vectors as given: g1 = 100, g2= 101, g3=111. Draw the encoder, state diagram and trellis diagram.	8	CO6	Ap