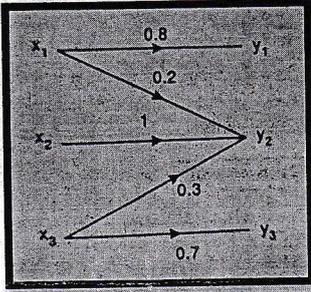


K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

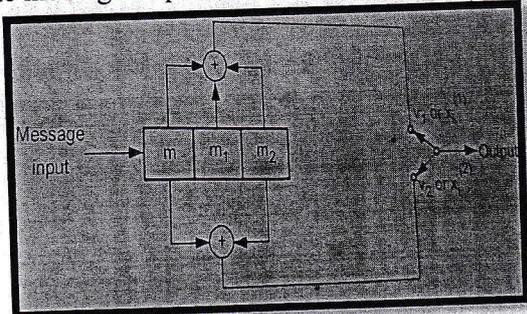
~~Nov - Dec~~ 2025
 (B. Tech.) Program: Artificial Intelligence and Data Science Scheme :III / **II B**
Supplementary ~~Regular~~ Examination: TY Semester: V
 Course Code: AIC503 and Course Name: Information Theory and Coding
 Date of Exam: **04/02/26** Duration: 02.5 Hours Max. Marks: 60

Instructions:

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

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any two questions out of three: (05 marks each)	10		
a)	Define entropy of messages give example and explain entropy properties		1	U
b)	Compare Shannon Fano and Huffman coding		2	U
c)	Encode the following sequence using LZ78 approach 'sirusidueastmanueasilyuteasesuseausickuseals'		3	Ap
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Explain different approaches to image compression.		4	U
b)	Explain in details A law compression and μ law companding		5	U
c)	The generator polynomial of (7,4) cyclic code is $G(p)=p^3+p+1$. Find all code vectors for the code in nonsystematic form.		6	Ap
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	A discrete source emits messages x_1, x_2, x_3 with probabilities 0.3, 0.4 and 0.3. The source connected to the receiver as shown in diagram. Calculate all entropies and mutual information. <div style="text-align: center; margin: 10px 0;">  </div>		1	Ap
b)	A source emits letters from an alphabet $A=\{m,n,o,p,q\}$ with probabilities $\{0.1,0.3,0.3,0.15,0.15\}$ respectively. Find Shannon Fano code. Find Huffman code. Compare average length and redundancies for both the codes		2	Ap

~~Jan-Feb~~ ~~Nov-Dec~~ 2025
 (B. Tech.) Program: Artificial Intelligence and Data Science Scheme :III / IIB
 Supplementary Regular Examination: TY Semester: V
 Course Code: AIC503 and Course Name: Information Theory and Coding
 Date of Exam: 04/02/26 Duration: 02.5 Hours Max. Marks: 60

c)	Given the following printed dictionary and the received sequence below build an LZW dictionary and decode the sequence. Received sequence is: 4,5,3,1,2,8,2,7,9,7,4																
	<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">Initial Dictionary</th> </tr> <tr> <th>Index</th> <th>Entry</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">S</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">#</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">I</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">T</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">H</td> </tr> </tbody> </table>	Initial Dictionary		Index	Entry	1	S	2	#	3	I	4	T	5	H	3	Ap
Initial Dictionary																	
Index	Entry																
1	S																
2	#																
3	I																
4	T																
5	H																
Q.4 Solve any two questions out of three. (10 marks each)																	
a)	Explain MPEG Video standard and explain MPEG video frames in details	4	U														
b)	Explain ADPCM encoder and decoder in detail	5	U														
c)	For the convolution encoder determine, dimension of the code, code rate, Constraint length, Generating sequences (Impulse responses) output sequence for the message sequence of $m = \{1\ 0\ 0\ 1\ 1\}$	20															
		6	Ap														
