Time: 3 Hours **Marks: 80**

NB: (1) Question No.1 is compulsory.

(2) Attempt any three out of remaining five questions

(3) Assume suitable data, if necessary.

Q.1	Answer any **four** of the following:	20
a)	What is coding redundancy? Explain.	5
b)	State and explain Bayes' theorem.	5
c)	A discrete memoryless source is capable of transmitting three distinct symbols x0, x1,x2 with probabilities ½, ¼, and ¼ respectively. Write the mathematical expression of Entropy and calculate source entropy.	5
d)	Describe the format and significance of Channel Matrix.	5
e)	Define 'amount of information', and Entropy. Explain the different properties of information.	5
Q.2 a)	What is Lempel Ziv Welch (LZW) algorithm? Determine the code for following bit stream 01001111100101000010	10
b)	Explain the following terms for convolution code 1.Code tree 2.Trelli's diagram 3.State diagram	10
Q.3 a)	Explain Shannon's Theorem on channel capacity and calculate channel capacity of binary symmetric channel with error probability 0.2.	10
b)	Obtain Huffman codes for message signals, S0, S1, S2, S3 and S4 with the probabilities as 0.4,0.2,0.2,0.1,0.1 respectively.	10
Q.4 a)	Draw block diagram of digital communication and illustrate function of each block.	10
b)	Explain Viterbi algorithm.	10

Q.5a) The Voice signal in a PCM system is quantized in 16 levels with the following probabilities P1=P2=P3=P4=0.1, P5=P6=P7=P8=0.05 P9=P10=P11=P12=0.075 P13=P14=P15=P16=0.025. Calculate the Entropy and Information rate, when the information signal frequency is 4kHz. 10

b) A (7,4) linear block code of which generator matrix is given as 10

$$G=\begin{vmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{vmatrix}$$

Find code vector for any six messages
Write the parity check matrix of this code.

Q.6a) Explain MPEG audio coder. 10

b) Compare Lossy and Lossless compression methods. 10