Time:3 hours **Marks: 80**

N.B.: (1) Question No.1 is compulsory
(2) Write any three questions from Q. 2 to Q.6.
(3) Draw a neat diagram wherever necessary.
(4) Assume suitable data, if required and state it clearly.

Q.1 Attempt any FOUR. 20

(A) Define code rate, code efficiency, systematic and non-systematic code in context with linear block code. 5

(B) Compare Inter Symbol Interference and Inter Channel Interference. 5

(C) Define entropy and when entropy is maximum. 5

(D) Explain channel coding and source coding. 5

(E) Compare ARQ and FEC systems. 5

Q.2 (A) A DMS has an alphabet of seven symbols with probabilities as given - 10

Symbol	a	b	c	d	e	f	g	h	i
Probabilities	0.25	0.2	0.13	0.12	0.1	0.08	0.06	0.04	0.02

Calculate Huffman code and code efficiency.

(B) Explain necessity of line code and what are the characteristics of line codes. 10

Q.3 (A) Explain OQPSK transmitter with block diagram and draw the modulated output waveform for the given input sequence b(t) = 1001110 10

(B) Consider 1/3 rate convolutional coder with $g_1(100)$, $g_2(101)$, $g_3(111)$. Draw the Encoder diagram, State table and state diagram. Calculate code word for message vector 101011. 10

Q.4 (A) MSK is called shaped QPSK, draw MSK transmitter block diagram and explain. 10

(B) linear block code (7,4) the given generator matrix 10

$$G = \begin{bmatrix} 1\,1\,0\,1\,0\,0\,0 \\ 1\,1\,1\,0\,1\,0\,0 \\ 0\,1\,1\,0\,0\,1\,0 \\ 1\,0\,1\,0\,0\,0\,1 \end{bmatrix}$$

1. Obtains code vector for 0010 and 0011
2. Find corresponding parity check matrix.

Q.5 (A) Explain BPSK transmitter and receiver block diagram and draw waveforms. 10

(B) What is matched filter. Explain properties of Matched filter. 10

Q.6 (A) Explain soft decision and hard decision decoding. 10

(B) Explain benefits of digital communication and explain block diagram of digital communication system. 10