(3 Hours) **[Total Marks: 80]**

N.B: (1) Questions No.**1** is **compulsory.**

(2) Attempt **any three questions** out of remaining five questions.

(3) Assume suitable data if required.

(4) Figures to the right indicate full marks

Que.1 Answer the following **(Any Four)** **20**

a. Define the following terms and give their significance (i) Mean (ii) Central moment (iii) Variance (iv) Standard deviation.

b. What is Entropy of an information source? When is entropy maximum?

c. Compare intersymbol interference and interchannel interference

d. Differentiate between QPSK and OQPSK

e. Compare optical fibre with coaxial cable and twisted pair cable

Q2.

a) Explain with neat diagram transmitter, receiver and waveforms the BPSK modulation System. Sketch signal space diagram and PSD of BPSK. **10**

b) A discrete memory less channel has an alphabet of six symbols, with the probabilities as given below

S1	S2	S3	S4	S5	S6
0.30	0.25	0.2	0.12	0.08	0.05

Construct the Huffman code and find entropy and average code word length of code Also calculate the code efficiency and redundancy of the code **10**

Q3.

a) Linear block code having following parity check equations –

$c4=d1 \oplus d2 \oplus d3$,

$c5=d1 \oplus d2$,

$c6=d1 \oplus d3$.

Calculate

i) G & H matrix ii) error detection, Correction capacity of the code;

iii) decode the received codeword-------101100 **10**

b) Discuss the problem of inter symbol interference (ISI). Explain the measures to be taken to reduce ISI. How to study ISI using eye pattern? **10**

Q4.

a) Explain the working of Minimum Shift Keying, modulator and demodulator, with the help of block diagram and waveforms. **10**

b) Derive the expression for the probability of error of the matched filter. **10**

Q5)

a) Over a long transmission line draw the following data format for the binary sequence 10110100101. i) Unipolar NRZ ii) Polar RZ iii) Manchester Select the best and justify the answer. **10**

b) A (7, 4) cyclic code is generated using the generator polynomial $g(x) = 1+x+x^3$

i) Generate the systematic cyclic code for the data 1100 and 1001(MSB) by long division method

ii) Draw the encoder and show how code words are generated for the data 1100, by tracing the path through the encoder and verify the result. **10**

Q6) Write a short note on **20**

a) Duo-binary encoding

b) QAM

c) Satellite communication system

d) Convolution code

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