

Duration: 3hrs

[Max Marks:80]

- N.B.: (1) Question No 1 is Compulsory.
 (2) Attempt any three questions out of the remaining five.
 (3) All questions carry equal marks.
 (4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR [20]

a Define [05]

1. Entropy

2. Spectral efficiency

3. Code rate of block codes

b Explain the Concept of Inter symbol interference (ISI) and measures to reduce it. [05]

c State Shannon – Hartley channel capacity Theorem and discuss its Implications. [05]

d For the following bit sequence 110010 draw the waveforms for RZ unipolar, RZ Polar, NRZ polar, AMI, Manchester line coding techniques. [05]

e Compare block coding and convolutional coding technique [05]

2 a A (7,4) cyclic code with $g(x) = x^3 + x + 1$ [10]

i) Generate a systematic codeword for data 1100

ii) Verify result by encoder circuit and show how parity bits are generated for the data sequence 1100.

iii) Draw decoder for the same system

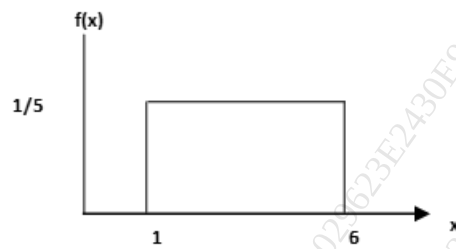
b Consider a DMS $S = (S_1, S_2, S_3, \dots, S_7)$ with following message probability. [10]

S_i	S_1	S_2	S_3	S_4	S_5	S_6	S_7
$P(S_i)$	0.40	0.25	0.15	0.10	0.05	0.03	0.02

Encode the source using Huffman algorithm. Find the average code length and efficiency.

3 a Explain working of duobinary encoder and decoder with proper diagram. What are the drawbacks of duobinary encoder. Generate coder output for binary data bit stream 00101. [10]

b



[10]

A random variable is uniformly distributed over (1, 6).

1. Find and plot PDF and CDF.
2. Calculate mean, variance, standard deviation

a Mention needs of channel encoding

[10]

Consider (6,3) linear Block code with generator matrix

$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

- i) Obtain all possible codewords
- ii) Obtain dmin of above code
- iii) Error detection and correction capability

b Describe MSK in detail with explaining how the drawbacks of QPSK have overcome using MSK ?

[10]

5 a Derive the expression for the error probability for Integrator and Dump filter.

[10]

b A (2,1,2) convolutional code is described by the generator sequence

[10]

$$g_1 = 1+D+D^2 \quad \& \quad g_2 = 1+D^2.$$

Obtain

- i) State transition table
- ii) State diagram
- iii) Encode the message 10011

6 Write short note on any two

[10]

1. QAM
2. Matched filter and its probability of error.
3. M-ary PSK

[10]
