[6262]-93

T.E.(E&TC)

DIGITAL COMMUNICATION

(2019 Pattern) (Semester -I) (304181)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) What is OFDM? Draw and Explain block diagram of generation and reception of the OFDM. **[8]**

b) Compare BPSK, QPSK and M-ary PSK **[9]**

OR

Q2) a) What is M-ary FSK? Draw and Explain Block diagram of generation and reception of the M-ary FSK. **[8]**

b) Calculate bandwidth requirement and minimum separation of signal points in signal space for **[9]**
BPSK
QPSK
16PSK
Given that input bit rate is 8kbps and energy per bit duration is $1\times10^{-4}J$.

Q3) a) Explain spread spectrum transmission and reception process in SS communication with neat block diagram. **[9]**

b) The information bit duration in DS-BPSK spread spectrum communication system is 4ms while the chipping rate is 1 MHz. Assuming an average error probability of 10^{-5} for proper detection of message signal. Calculate the jamming margin. Given $Q(4.25)= 10^{-5}$ **[9]**

OR

P.T.O.

Q4) a) Write a short note on following: **[9]**
 i) Slow FHSS
 ii) Fast FHSS

 b) What is PN sequence? Explain properties of PN sequence. **[9]**

Q5) a) Explain difference type of discrete memoryless channel. **[8]**
 b) Find coding efficiency of a source encoder generating messages with probability $1/4, 1/8, 1/2, 1/8$ using Shannon-fano coding technique. **[9]**

OR

Q6) a) A 3 bit PCM system generates 1,000 samples per second, if the quantized samples produced by the system have Probabilites $\{1/4, 1/4, 1/8, 1/8, 1/16, 1/16, 1/16, 1/16,\}$. Find the rate of information . If the samples are equiprobable. What will be the rate of information? **[8]**

 b) Apply Huffman coding for the following message ensemble. **[9]**
 X=[x1 x2 x3 x4 x5 x6 x7]
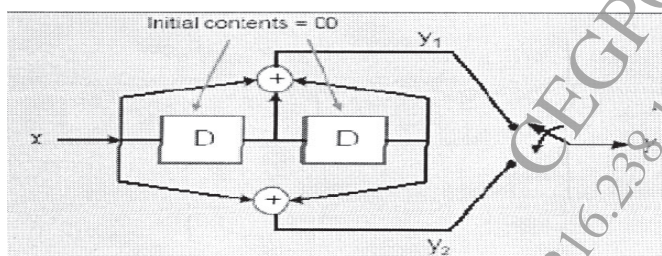 P=[0.45 0.15 0.1 0.1 0.08 0.08 0.04] and find coding efficiency

Q7) a) For a systematic linear block code, the three parity check digits, are given by **[9]**

$$C_4 = d_1 \oplus d_2 \oplus d_3$$
$$C_5 = d_1 \oplus d_2$$
$$C_6 = d_1 \oplus d_3$$

 i) Construct Generator Matrix
 ii) Construct All Code generated by this matrix
 iii) Determine error correcting capability
 iv) Prepare suitable decoding table
 v) Decode the received words 0 0 0 1 1 0

 b) **[9]**

For given convolutional encoder draw three graphical representation.

OR

Q8) a) Draw the encoder and syndrome calculator for the generator polynomial $g(x) = 1 + x^2 + x^3$ and obtain the syndrome for the received codeword 1 0 0 1 0 1 1 **[9]**

b) Explain properties of Linear block code and cyclic codes with suitable example **[9]**

ය්‍ය ය්‍ය ය්‍ය