UNIT TEST-1   TIME: 1 HOUR

THIRD YEAR (T.E.)   Marks-30

Signal Coding and Estimation Theory

Q.1 a) State the Three Shannon's theorem of information theory /capacity   (6)

   b) Explain different types of channels   (4)

OR

Q.2 a) Give the properties of Mutual Information and Entropy   (6)

   b) Define Information Rate, redundancy ,self information and capacity   (4)

Q.3 a) Consider DMS with source probabilities 0.20,0.20, 0.15, 0.15 ,0.10,0.10,0.05,0.05

   i) Determine an efficient fixed length of codeword

   ii) Huffman code for the same and compare two codes   (7)

   b)Explain Sphere packing problem   (3)

Q.4 a)Construct the Shannon fano code for the symbol 0.5, 0.125, 0.125,0.0625,0.0625,0.03125,0.03125 . Determine efficiency and entropy.   (7)

   b) Show Entropy is maximum when all the messages are equiprobable.   (3)

UNIT TEST-2	TIME: 1 HOUR
THIRD YEAR (T.E.)	Marks-30

Signal Coding and Estimation Theory

Q.1 a) For a systematic LBC the 3 parity check bits C4,C5,C6 are given by

C4= m1 xor m2 xor m3

C5= m1 xor m2

C6=m1 xor m3

Calculate 1) Generator Matrix

2)Construct all codes generated by matrix

3)Determine error detecting and correcting capability

4)Prepare suitable decoding table

5) Decode the code 101100 and 000110   (12)

Q.2   For the rate 1/3 convolution codes with constraint n=3,k=1 where generator polynomials g1=110,g2=111, g3=011   (12)

Q.3 write short note on Golay codes, CRC codes.   (6)

Q 1.   **[A]**   For the given string-'ZABAPENA', generated by the source (DMS) find codeword   (7)
using Huffman Algorithm and efficiency of the code.

[B]   Consider a DMS with source probabilities {0.20, 0.20, 0.15, 0.15, 0.10,   (7)
0.10, 0.05,0.05}
       1) Determine an efficient fixed length 'R' of the code words.
       2)Determine the Huffman code for this source.
       3) Compare the two codes and comment.

Q.2   **[A]**   A discrete source emits one of the five symbols once every millisecond. The   (6)
symbol probabilities are ½,1/4, 1/8,1/16 and 1/16 respectively. Find the source
entropy and information rate.
[B]   Explain in detail the Rate distortion Function.   (6)
[C]   Define Information? Explain the properties of mutual information.   (4)

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Department of Electronics and Telecommunication Engineering
UNIT TEST I – Signal Coding & Estimation Theory
Time: 1 Hour 30 Min.   **Class: T.E. I**   **Max. Marks: 50**

Q 1.   **[a]**   Design (3,1) cyclic repetition code and its decoding method. Find corrected code words   **(10)**
for : (i) 010
    (ii)110.

     [b]   For (7,4) Linear Cyclic Code , with $G(P)=1+D+D^3$ ' find out syndrome for the received   **(8)**
sequence '1111011' with the help of syndrome calculator using hardware arrangement.

Q.2   **[a]**   For the convolution encoder shown, sketch the state diagram and Trellis diagram. Find   **(10)**
the output data sequence for the input data sequence 10110.
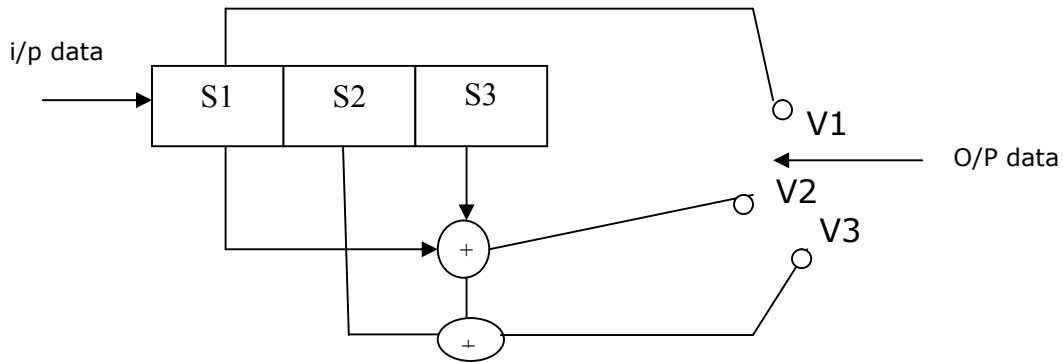
     [b]   Explain in detail TCM. What is significance of this coding over other coding techniques?   **(8)**

Q.3   **[a]**   Let C be a binary perfect code of length 'n' with minimum hamming distance 7.For n=7   **(7)**
or n=23 .Find the order (n,k) for the LBC.

     [b]   What are properties of CRC code ? What is criteria to choose polynomial in CRC divisor ?   **(7)**
Comment on error detection properties of CRC code.