**SWARNANDHRA INSTITUTE OF ENGINEERING & TECHNOLOGY**

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Department of Electronics & Communication Engineering

**NAME: A.KARNA RAO SUBJECT : Digital Communications**

**DEPT: ECE CLASS: III ECE-A&B**

**SET-I**

1. Define the concept of amount of information and derive properties of information.
2. A DMS X has five symbols x1, x2, x3, x4 and x5 with respective probabilities 0.2, 0.15, 0.05, 0.1 and 0.5. Construct Huffman code and calculate the code efficiency.
3. Using Transform domain approach of convolutional codes, find coded sequence for the given rate ½ encoder with generator sequences g1= (1, 1, 1), g2 = (1, 0, 1) and message m = (10011**).**

**SET-II**

1. An analog signal band limited to 10kHz is quantized in 8 levels of a PCM System with probabilities of 1/4, 1/5, 1/5, 1/10, 1/10, 1/20, 1/20 and 1/20 respectively. Calculate the entropy and the rate of information.
2. Consider five messages given by the probabilities 1/2, 1/4, 1/8, 1/16, 1/16.

(i) Calculate H (ii) Use Shannon-Fano algorithm to develop an efficient code and for that code.

1. For a systematic linear block code, the three parity check digits, C4, C5, and C6 are given by

c4= d1+d2+d3, c5=d1+d2, c6=d1+d3

* + - * 1. Construct generator matrix,
        2. Construct code vectors generated by this matrix
        3. Decode the received words 101100 and 000110

**SET-III**

1. Explain the concept of Entropy and derive the properties of Entropy.
2. The data is to be transmitted at the rate of 10000 bits /sec over a channel having band width

B=3000 Hz. Determine the signal to noise ratio required. If the bandwidth is increased to

10000 Hz, then determine the signal to noise ratio**.**

1. For the (7, 4) binary cyclic code generated by g(x) = 1+p+p3. Write the code words for given

messages (1, 1, 1, 0) and (1, 0, 0, 1) in systematic form**.**

**SET-IV**

1. Explain the concept of Mutual information and its properties.
2. Explain the tradeoff between bandwidth and signal to noise ratio**.**
3. Construct Code Tree, Code Trellis and State diagram for rate 1/3 convolutional encoder with Constraint length 3 and generator sequences g1(x)=1+x2 , g2(x)= 1+x and g3(x)= 1+x+x2