UNIT- III

SOURCE CODES, LINE CODES & ERROR CONTROL (Qualitative) PART -A

1. List the types of characters used in data communication codes. (**BT-1)**
2. Describe the error control schemes used in Modems. (**BT-1)**
3. Discuss about the two general categories of error control. (**BT-2)**
4. Differentiate error detection from error correction. (**BT-2)**
5. Give the significance of AMI code**.** (**BT-2)**
6. Discuss about the Redundancy in Error control. (**BT-2)**
7. An analog signal is band limited to B Hz, sampled at the Nyquist rate, and the samples are quantized into 4 levels. The quantization levels Q1,Q2,Q3 and Q4 are assumed to be independent and occur with probabilities $p_1 = p_4 = 8^{1}$ and $p_2 = p_3 = 8^{3}$ .calculate the information rate of the source. (**BT-3)**
8. List the error controls schemes used in Modems. (**BT-1)**
9. For a 12 bit data string of 1011 0010 0010,Calculate the number of hamming bits required. (**BT-3)**
10. Analyze about the working rule of AMI code. (**BT-4)**
11. Explain vertical redundancy checking. (**BT-4)**
12. List the different error control methods. (**BT-1)**
13. Classify the types of characters used in data communication codes. (**BT-4)**
14. Describe the significance of source coding. (**BT-1)**
15. Compare block and convolution codes. (**BT-5)**
16. Evaluate the Hamming distance between the following code words C_1={1,0,0,0,1,1,1} and C_2={0,0,0,1,0,1,1} (**BT-5)**
17. A source transmits messages Q_1 to Q_5 having probabilities $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}$ respectively. Estimate the average information of the source. (**BT-6)**
18. An event has six possible outcomes with probabilities {1/2, 1/4, 1/8, 1/16, 1/32, 1/32}. Calculate the entropy of the system. (**BT-3)**
19. Discuss why the Huffman code called as minimum redundancy coding. (**BT-6)**
20. List the properties of Hamming distance. (**BT-1)**

PART – B

1 For the given 8 bit stream 11010100, plot the NRZ, RZ, AMI, HDBP and Differential Manchester codes. **(BT-2)** **(16)**

2 Describe about the viterbi algorithm by showing the possible path through the trellis of a coder. Assume the state diagram of any coder.**(BT-1)** **(16)**

3 **(i)** Discuss the Bandwidth-SNR trade off of a communication system.**(BT-2)** **(4)**

(ii) Apply the following coding technique and obtain the output wave form for the bit stream 10011100 on NRZ, RZ, AMI, HDBP, ABQ and MBnB. **(BT-3)** **(12)**

4 **(i)** Design a convolutional coder of constraint length 6 and rate efficiency ½.**(BT-6)** **(4)**

(ii) State and prove Shannon noiseless coding theorem. **(BT-1)** **(12)**

5 **(i)** Given states S={S_0,S_1,S_2,S_3,S_4} and their probabilities P={0.4,0.2,0.2,0.1,0.1}. Find coding efficiency and entropy for Huffman coding.**(BT-6)**

(ii) Give the procedure for Shannon Fano coding and use the procedure to obtain the code for the source symbols S_0, S_1, S_2, S_3, S_4, S_5 with their respective probabilities ½, 1/3, 1/12, 1/15, 1/120, 1/120. **(BT-6)**

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6 Discuss the concept of coding and decoding methods of block codes with its mathematical framework and diagram.**(BT-2)** **(16)**

7 **(i)** Explain Bandwidth-SNR trade off in source coding **(BT-4)** **(8)**

(ii) Explain various types of Leni coding techniques. **(BT-4)** **(8)**

8 **(i)** Describe the concept of noiseless coding theorem and state its significance. **(BT-1)** **(8)**

(ii) Describe in detail about error control codes and their applications**. (BT-1)** **(8)**

9 Evaluate the Block check sequence (BCS) for the following data and cyclic redundancy check(CRC) generating polynomials: data $G(x) = x^7 + x^5 + x^4 + x^2 + x^1 + x^0$, CRC $P(x) = x^5 + x^4 + x^1 + x^0$. Also Explain the Concept of block codes and coding efficiency.**(BT-5)** **(16)**

10 **(i)** Explain in detail about various error control codes with one example for convolution code. **(BT-4)** **(12)**

(ii) Show the plots for the polar, unipolar, bipolar and Manchester NRZ line code format for an information {1 0 11 0 0}. **(BT-3)** **(4)**