No. of Printed Pages : 3 **BIELE-010**

B.Tech. - VIEP - ELECTRONICS AND COMMUNICATION ENGINEERING

(BTECVI)

Term-End Examination, 2019

BIELE-010 : SIGNAL COMPRESSION

Time : 3 Hours] **[Maximum Marks : 70**

Note : Attempt **any seven** questions. **All** questions **carry equal** marks. Use of scientific calculator is permitted. Missing data, may be suitably assumed.

1. (a) Explain Extended Huffman coding with suitable example. [5]

   (b) Explain Adaptive Huffman coding with suitable example. [5]

2. Perform the Arithmetic coding for a message "e a i i !". If a source that generate symbols {a, e, i, o, u, !} with the probability model P(a) = 0.2, P(e) = 0.3, P(i) = 0.1, P(o) = 0.1, P(u) = 0.2, P(!) = 0.1. [10]

3. Compare the average information (in Bits/symbol) content of given message if coded through : [10]

(a) Huffman Code

(b) Tunstall Code

Message is "a a b c c c".

If memoryless source emits the symbols {a, b, c} with following probabilities.

P(a) = 0.5

P(b) = 0.25

P(c) = 0.25

4. (a) Explain Lempel Ziv-78 (LZ 78) algorithm with suitable example. [5]

(b) Explain Dynamic Markov compression with suitable example. [5]

5. Prove that the Rate distortion function for memoryless Gaussian source with a variance σ^2 is : [10]

$$R(D) \begin{cases} \frac{1}{2}\log_2 \frac{\sigma^2}{D} & 0 \le D \le \sigma^2 \\ 0 & D > \sigma^2 \end{cases}$$

6. In source coding theorem context, Prove that " For any block code with block length n and coding rate less than H(X) - ξ, where ξ>0 does not change with n, then $P_e \to 1$ as $n \to \infty$. [10]

7. (a) Explain Linde Buzo Gray Algorithm with suitable example. [5]

   (b) Explain Tree Structured vector Quantizers with suitable example. [5]

8. (a) Write limitations of Discrete Cosine Transform.[5]

   (b) Enlist the advantages of Discrete Cosine Transform (DCT) over the Discrete Fourier Transform (DFT). [5]

9. Explain Walsh Hadamard Transform with suitable example. [10]

10. Write short notes on **any two** of the following :[2×5=10]

    (a) Golomb Codes

    (b) Lattice Vector Quantizers

    (c) Karhunen Loeve Transform

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