00221

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

December, 2013

BIELE-010 : SIGNAL COMPRESSION

Time : 3 hours   *Maximum Marks : 70*

Note :   (i)   Attempt **any seven** questions.

(ii)   **All** questions carry **equal** marks.

1.   (a)   What are the measures of performances of a compression algorithm ? What do you mean by compression ratio 4 : 1 ? Explain with an example.   **5+5=10**

(b)   Explain Shannon's theorem. Find out the expression for information associated with two independent events A and B. If a coin is thrown such that $P(H)=\dfrac{1}{8}$ and $P(T)=\dfrac{7}{8}$, find out the information associated with these two outcomes.

2.   (a)   Explain the properties of average information and derive its expression .   **5+5=10**

(b)   Explain Markov's model by deriving its expression .

3.   (a)   Describe the Huffman Coding algorithm.

     (b)   Design a Huffman Code for a source that puts out letters from an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with $P(a_1) = P(a_3) = 0.2$, $P(a_2) = 0.4$ and $P(a_4) = P(a_5) = 0.1$. The entropy for this source is 2.122 bits/symbol. What is the average length for this code ?

5+5=10

4.   (a)   Explain Golomb Codes. Design a Golomb Code for $m = 5$.   **5+5=10**

     (b)   What are the CCSDS recommendations for lossless compression ?

5.   Explain the following applications of LZW   **10** algorithm.

     (a)   Graphics Interchange Format (GIF)

     (b)   Portable Network Graphics (PNG)

6.   Differentiate between forward adaptive   **10** quantization and backward adaptive quantization with suitable examples.

7.   (a)   Write down the steps of Linde-Buzo-Gray algorithm for the case when we have a training set.   **5+5=10**

     (b)   Explain about the tree structured vector quantization.

8.   (a)   Derive the rate distortion function $R(D)$ for Gaussian sources and explain Shannon lower bound.   **5+5=10**

     (b)   Mention the advantages of vector quantization over scalar quantization. Explain with suitable example.

9. (a) Encode the following sequence using Burrows - Wheeler Transform : **5+5=10**

   t h i s $\not{b}$ i s $\not{b}$ t h e , where ($\not{b}$ represent space).

   (b) Differentiate between DCT and DST with respect to KLT transform.

10. Write short notes on **any two** of the following :
    (a) Wavelet based compression
    (b) JPEG 2000 standard   **2x5=10**
    (c) The Channel Vocoder
    (d) Code Excited Linear Prediction (CELP)

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