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BIELE-010

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00635

Term-End Examination

June, 2014

BIELE-010 : SIGNAL COMPRESSION

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. All questions carry equal marks.*

1. (a) Differentiate between lossless and lossy compression technique.

(b) Define the following terms :

(i) Compression ratio

(ii) Distortion

(iii) Fidelity

(iv) Vocoder *2×5=10*

2. (a) If $P(S_w) = \frac{30}{31}$, $P(S_b) = \frac{1}{31}$, P(w/w) = 0·99, P(b/w) = 0·01, P(b/b) = 0·7, P(w/b) = 0·3, then find out the entropy using the Simple probability model and by Markov's model.

(b) Explain the adaptive Huffman Coding algorithm by drawing its flow chart. *2×5=10*

3. (a) What are the advantages of Tunstall Codes ? Design a 3-bit Tunstall code for a memoryless source with the following alphabet :

$\mathcal{A}$ = {A, B, C}

P(A) =0·6, P(B) = 0·3, P(C) = 0·1.

(b) Describe the decoding procedure using Huffman Coding with the help of flow chart. *2×5=10*

4. (a) Describe the LZ77 approach of encoding the following sequence :

... cabracadabrarrarrad ...

(b) Explain the LZW algorithm using a suitable example. *2×5=10*

5. (a) Explain Burrows-Wheeler Transform (BWT) algorithm using suitable examples.

(b) Draw the following using BWT : *2×5=10*

$$F = \begin{bmatrix} \not\beta \\ \not\beta \\ e \\ h \\ h \\ i \\ i \\ s \\ s \\ t \\ t \end{bmatrix} \qquad L = \begin{bmatrix} s \\ s \\ h \\ t \\ t \\ h \\ \not\beta \\ i \\ i \\ \not\beta \\ e \end{bmatrix}$$

[$\not\beta$ represents space]

6. (a) Explain Dynamic Markov compression with appropriate state diagram.

(b) Derive the rate distortion function R(D) for binary sources. *2×5=10*

7. What is uniform quantization ? How is it performed for a uniformly distributed source ? Derive the expression of SNR for a fixed length code. *10*

8. Explain Karhunen-Loeve Transform (KLT) algorithm. Show that the transform matrix 'K' is not a function of the auto correlation value for 2×2 KLT. *10*

9. (a) Discuss the discrete Walsh-Hadamard Transform using suitable diagram and example.

   (b) Explain wavelet based compression using suitable diagram. *2×5=10*

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

   (a) Sub-band Coding

   (b) MPEG

   (c) Embedded Zerotree Coder

   (d) HDTV