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BIELE-010

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

00493

Term-End Examination

December, 2016

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 allowed. Missing data may be suitably assumed.*

1. (a) Explain the concept of signal compression with a suitable diagram. *4*

(b) What is the difference between Lossless and Lossy compression ? *4*

(c) What is entropy ? *2*

2. (a) What is the need of extended Huffman coding and adaptive Huffman coding ? *5*

(b) Determine whether the following codes are uniquely decodable or not : *5*

(i) {0, 01, 11, 111}

(ii) {0, 01, 110, 111}

3. (a) 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 $P(a_1) = P(a_3) = 0{\cdot}2$

$P(a_2) = 0{\cdot}4$ and $P(a_4) = P(a_5) = 0{\cdot}1$. 4

(b) Explain about the application of Huffman and Arithmetic coding ? 4

(c) What are minimum variance Huffman codes ? 2

4. (a) For an alphabet $A = \{a_1, a_2, a_3\}$ with probabilities $P(a_1) = 0{\cdot}7$, $P(a_2) = 0{\cdot}2$, $P(a_3) = 0{\cdot}1$. Design a 3-bit Tunstall code. 5

(b) Explain the difference between Golomb codes and Run Length codes. 5

5. (a) What do you mean by Dictionary techniques ? Explain its types with suitable examples. 5

(b) Explain LZ77 algorithm and mention how it is different from LZ78. 5

6. (a) State and prove the Rate Distortion theory. 4

(b) Explain the Rate distortion function for the binary source. 4

(c) What are the properties of Rate distortion function ? 2

7. (a) What is the technique of quantization ? What are the types of quantization that exist. List the applications of quantization. 5

(b) What is the difference between scalar quantization and vector quantization ? Explain in brief. 5

8. (a) What do you mean by subband coding of speech signal ? Explain about subband coding with a neat block diagram. 5

(b) Describe KLT (Karhunen-Loève Transform) algorithm with a suitable example. 5

9. (a) What are the differential encoding schemes available ? 4

(b) Differentiate between subband and wavelet ? Explain. 3

(c) What are the Audio/Video compression standards available ? 3

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

(a) Dynamic Markov Compression

(b) Linde-Buzo-Gray Algorithm

(c) Discrete Walsh-Hadamard Transform