

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

00579

Term-End Examination

December, 2017

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) Write down the various applications of arithmetic coding. 5
- (b) Consider a source that puts out letters from the alphabet $A = \{a_1, a_2, a_3\}$ with the probability models $P(a_1) = 0.8$, $P(a_2) = 0.02$ and $P(a_3) = 0.18$. The entropy for this source is 0.816 bits/symbols. Calculate the Huffman code for this source and number of bits that is more required than the minimum bits. 5

2. What are the advantages of adaptive Huffman coding ? Explain coding and decoding procedure of adaptive Huffman coding with appropriate example. 10

3. (a) Design a 3-bit Tunstall code for a memoryless source with the following alphabet : 5

$$A = \{a, b, c\}$$

$$P(a) = 0.6, P(b) = 0.3 \text{ and } P(c) = 0.1$$

(b) Describe the LZ77 approach of adaptive dictionary with appropriate example. 5

4. Discuss the Dynamic Markov Compression algorithm and answer these issues : $4 \times 2 \frac{1}{2} = 10$

(a) What is the initial number of states ?

(b) How do we estimate probabilities ?

(c) How do we decide when a state needs to be closed ?

(d) What do we do when the number of states become too large ?

5. Explain the following applications of LZW algorithm : $2 \times 5 = 10$

(a) Graphics Interchange Format (GIF)

(b) Portable Network Graphics (PNG)

6. (a) What is meant by Mean Squared Error ? How do we measure the closeness or fidelity of a reconstructed source sequence to the original ? 5
- (b) Describe tree-structured vector quantizer approach with a suitable example. 5
7. (a) What is Quantization Noise ? How can quantization noise be minimised ? Enlist the various types of quantization techniques used in various coding schemes. 5
- (b) Discuss MPEG video compression standards. 5
8. (a) Draw and explain Channel Vocoder Receiver. 5
- (b) Explain various differential encoding schemes used in compression. 5
9. Explain the different analysis and synthesis schemes for audio signals. 10
10. Write short notes on any *two* of the following : $2 \times 5 = 10$
- (a) Wavelet Based Compression
- (b) Discrete Sine Transform
- (c) Quantum State Encoding and Decoding

