B. Tech.
(SEM. VIII) EXAMINATION, 2006-07
DATA COMPRESSION

Time : 3 Hours] [Total Marks : 100

Notes : (1) Attempt all questions.
(2) All questions carry equal marks.

1 Attempt any four of the following : \( 5 \times 4 \)
   (a) What is data compression and why we need it? Explain compression and reconstruction
       with the help of block diagram.
   (b) State early examples of data compression.
   (c) Differentiate between static length and variable length coding schemes. Explain with the help
       of examples.
   (d) Based upon the requirements of reconstruction how data compression techniques are broadly
       classified. Explain these classifications in brief.
   (e) What are the measures of performance of data compression algorithms.
   (f) What is average information? What are the properties used in measure of average
       information.

VB-1051] 1 [Contd...
2 Attempt any four of the following: 5×4

(a) How modeling and coding are related? Explain with the help of examples.
(b) What do you understand by Markov model. Discuss the role of markov models in text compression.
(c) Describe the steps for a test for unique decodability.
(d) Write Huffman coding algorithm. How this algorithm is used to design Huffman code for a source that takes letter from an alphabet set
\[ A = \{a_1, a_2, a_3, a_4, a_5\} \]
(e) Explain minimum variance Huffman code and encoding procedure taking a suitable example.
(f) What do you understand by length of Huffman code and how it is defined?

3 Attempt any four of the following: 5×4

(a) Explain update procedure for the adaptive Huffman coding and encoding algorithm/flowchart.
(b) How rice code can be viewed? Explain the implementation of the rice code in the recommendation for loss less compression from the consultative committee on space data standards.
(c) Explain Tunstall codes with the help of example.
(d) Discuss the application of Huffman coding in different areas.
(e) How a tag is generated in arithmetic coding.
(f) Compare Huffman and Arithmetic coding.
4 Attempt any two of the following: 10×2
(a) Design and implement a diagram coder for text files of interest to you:
   (i) Explain the effect of dictionary size and the size of the text file being encoded on the amount of compression.
   (ii) Use the diagram coder on files that are not similar to the ones you used to design the diagram coder. How much this effect your compression.
(b) Discuss the steps involved in Basic Algorithm for Prediction with Partial Match (PPM)
(c) Discuss generic compression scheme with the help of block diagram. What are the distortion criteria for Lossy coding?

5 Attempt any two of the following: 10×2
(a) What is quantization? Explain additive noise model of a quantizer. Differentiate between scalar quantization and vector quantization. What are the advantages of vector quantization over scalar quantization?
(b) Explain uniform and non-uniform quantization with further classifications.
(c) Explain the steps of the Linde-Buzo-Gray algorithm.