(e) Discuss two probability models commonly used in design and analysis of lossy compression system.

(f) What is Rice code ? How it is different from Golomb code ?

4 Attempt any **two** of the following : 10×2=20

(a) What do you understand by uniform quantizer ? How uniform quantization of a uniformly distributed source and uniform quantization of non uniform sources is done ?

(b) Discuss the steps involved in Basic algorithm for Prediction with Partial Match (PPM).

(c) Describe tree structured vector quantizers.

5 Attempt any **two** of the following : 10×2=20

(a) Discuss the Linde-Buze-Gray algorithm in detail.

(b) what is quantization ? Explain additive noise model of a quantizer. Differentiate between scalar quantization and vector quantization. Discuss the advantages of vector quantization over scalar quantization.

(c) What do you understand by predictive coding ? Discuss multi resolution approaches.

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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0108 Roll No.

B. Tech

(SEM VII) ODD SEMESTER THEORY EXAMINATION 2009-10

DATA COMPRESSION

Time : 3 Hours] *[Total Marks : 100*

Note : *(i) Attempt all questions.*
(ii) All questions carry equal marks.
(iii) Assume data wherever not provided.
(iv) Be precise in your answer.

Attempt any **four** of the following : 5×4=20

(a) Explain compression and reconstruction with the help of block diagram.

(b) Determine whether the following codes are uniquely decodable :

(i) $\{0, 10, 110, 111\}$

(ii) $\{1, 10, 110, 111\}$

(c) Given an alphabet $A = \{a_1, a_2, a_3, a_4\}$ find the first order entropy in the following cases :

(i) $P(a_1) = P(a_2) = P(a_3) = P(a_4) = \frac{1}{4}$

(ii) $P(a_1) = \frac{1}{2}, P(a_2) = \frac{1}{4}, P(a_3) = P(a_4) = \frac{1}{8}$

(d) Comment upon the statement "Compression is still largely an art and to gain proficiency in an art you need to get a feel for the process."

(e) Differentiate between static length and variable length coding schemes.

(f) What is zero frequency model in Markov models in text compression ?

2 Attempt any four of the following : 5×4=20

(a) How Rice code can be viewed ? Explain the implementation of the rice code in the recommendation for loss less compression from the consultive committee on space data standard.

(b) Design a Golomb code for $m = 5$ where values of n are 0, 1, ...10.

(c) Generate Huffman code for a source

$A = \{a_1, a_2, a_3, a_4, a_5, a_6\}$ with probability model

$P(a_1) = P(a_3) = P(a_4) = 0.2$,

$P(a_2) = 0.25, P(a_5) = 0.05$ and

$P(a_6) = 0.1$

(d) Explain adaptive Huffman coding. How is it different from conventional Huffman coding ?

(e) Explain self information defined by Shannon.

(f) What do you understand by information and entropy ? Discuss the relationship between them.

3 Attempt any four of the following : 5×4=20

(a) What is facsimile encoding ? Explain run length coding technique used earlier for facsimile.

(b) How LZ 77 algorithm works ? What are the problems with LZ 77 ? Explain with an example.

(c) A sequence is encoded using LZW algorithm and the initial dictionary shown in the table :

Index	Entry
1	a
2	b
3	r
4	t

The output of LZW encoder is following sequence 3, 1, 4, 6, 8, 4, 2, 1, 2, 5, 10, 6, 11, 13, 6 decode this sequence.

(d) What are adaptive compression schemes ? What is the basic difference between adaptive and statistical compression scheme ? Discuss with the model of adaptive compression.