

- (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 : $10 \times 2 = 20$

- (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 : $10 \times 2 = 20$

- (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.



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

PAPER ID : 0108

Roll No.

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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.

1 Attempt any **four** of the following : $5 \times 4 = 20$

- (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

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

$$P(a_2) = 0.25, P(a_5) = 0.05 \text{ and}$$

$$P(a_6) = 0.1.$$

- (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.