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06CS/IS663

**Sixth Semester B.E. Degree Examination, June/July 2011**  
**Data Compression**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting atleast TWO questions from each part.**

**PART - A**

- 1
  - a. How the given code words are tested for unique decodability? Prove that the code :  $\{0, 01, 10\}$  is not uniquely decodable. (06 Marks)
  - b. Explain any two performance metrics for data compression schemes. (04 Marks)
  - c. Design the Huffman code words for the alphabet  $A=\{a_1, a_2, a_3, a_4, a_5\}$  with  $P(a_1) = P(a_3) = 0.2$ ,  $P(a_2) = 0.4$ , and  $P(a_4) = P(a_5) = 0.1$ . Also draw the Huffman tree diagram. (10 Marks)
- 2
  - a. Explain the LZ77 compression scheme with an example for coding and decoding. (10 Marks)
  - b. Write and explain the algorithm used by CALIC to form the initial prediction. (06 Marks)
  - c. How multi resolution approach helps in progressive image transmission? (04 Marks)
- 3
  - a. Explain the various distortion criteria used in lossy compression schemes. (04 Marks)
  - b. What is quantization? Explain the uniform quantization with fixed length code words. Give an example. (10 Marks)
  - c. Explain the forward and backward quantization process. (06 Marks)
- 4
  - a. What is vector quantization? Explain the vector quantization procedure with a block diagram. (08 Marks)
  - b. With a block diagram, explain DPCM differential coding technique. Explain the role of predictor. (08 Marks)
  - c. Explain the drawbacks of delta modulation with a sketch. (04 Marks)

**PART - B**

- 5
  - a. What are linear systems? Explain the properties of a linear system. (04 Marks)
  - b. Define Nyquists sampling theorem. Explain the ideal sampling in the frequency domain. (06 Marks)
  - c. What are transforms? Explain DCT with suitable diagram. Mention its advantage. (10 Marks)
- 6
  - a. What are filters? Explain the ideal and realistic low pass filters. (04 Marks)
  - b. Explain the sub – band coding with the help of an 8 – band filter bank. (08 Marks)
  - c. Explain the MPEG Audio coding algorithm with a suitable diagram. Also explain the frame structure for layer I coding. (08 Marks)
- 7
  - a. What are wavelets? Explain its use in image compression, with a neat sketch. (08 Marks)
  - b. Explain embedded zero tree wavelet with a suitable diagram. (08 Marks)
  - c. Briefly explain the SPIHT scheme. (04 Marks)
- 8
  - a. With a neat diagram, explain H.261 video coding algorithm. (08 Marks)
  - b. Consider the following  $4 \times 4$  image.

$$\begin{bmatrix} 110 & 218 & 116 & 112 \\ 108 & 210 & 110 & 114 \\ 110 & 218 & 210 & 112 \\ 112 & 108 & 110 & 116 \end{bmatrix}$$

- c. Apply Loop filter of H.261 coding algorithm. (06 Marks)
    - Briefly explain the H.263 video compression with a block diagram. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

