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## M.Tech. Degree Examination, June 2012

### Digital Signal Compression

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1
  - a. What is the necessity to compress the data? Explain it with the types of the data compression techniques giving suitable examples for each. Mention the performance parameters of compression. (08 Marks)
  - b. Model the following data sequence :  
 $X = [9, 11, 11, 11, 14, 13, 15, 17, 16, 17, 20, 21]$ . (08 Marks)
  - c. Define the following terms with examples:
    - i) Uniquely decodable codes
    - ii) Prefix codes (04 Marks)
- 2
  - a. Mention the functions of quantizer. Explain quantization of a uniformly distributed source. (06 Marks)
  - b. List the advantages of vector quantization over scalar quantization. Explain the vector quantization procedure. (08 Marks)
  - c. Explain LBG (Linde-Buzo-Gray) algorithm for vector quantization. (06 Marks)
- 3
  - a. Explain with a block diagram DPCM system, compare it with ADPCM. (10 Marks)
  - b. Define  $\mu$ -law and A-law used in audio compression. Explain how delta modulation helps in faithful reconstruction of signals. (10 Marks)
- 4
  - a. Explain how to obtain DCT and DST and DWHT. (10 Marks)
  - b. Explain JPEG image compression technique. (10 Marks)
- 5
  - a. Explain with a neat block diagram the subband coding system. (10 Marks)
  - b. How polyphase decomposition overcomes the difficulty of filters and down samplers in reconstruction of original signal? (10 Marks)
- 6
  - a. Explain how the image compression is done using wavelets using subband decomposition of an image. (12 Marks)
  - b. Define the following methods of coding used in:
    - i) EZW coder (Embedded Zero-tree Wavelet coder)
    - ii) SPIHT (set partitioning in hierarchical trees) (08 Marks)
- 7
  - a. Explain with a neat block diagram, the ITU 4.261 video coder. (10 Marks)
  - b. With a neat block diagram, explain MPEG-4 video coding for multimedia applications. (10 Marks)
- 8
  - a. Design a Huffman code for a source that puts out letters from an alphabet:  
 $A = \{a_1, a_2, a_3, a_4, a_5\}$  with  $P(a_1) = P(a_3) = 0.2$ ;  $P(a_2) = 0.4$ ;  $P(a_4) = P(a_5) = 0.1$ .  
 Calculate average length, entropy and redundancy and give the update procedure for adaptive Huffman coding algorithm. (12 Marks)
  - b. Write short notes on:
    - i) Arithmetic coding and its applications
    - ii) Facimile coding. (08 Marks)