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II Semester [Digital Electronics] 12EC030

**M.Tech. Degree Examination, Dec.2013/Jan.2014**  
**Digital Signal Compression**

Time: 3 hrs.

Max. Marks:100

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

- 1 a. What is uniquely decodable code? Determine whether the following codes are uniquely decodable:  
i) {0, 01, 11, 111}; ii) {0, 01, 110, 111}; iii) {0, 10, 110, 111}; iv) {1, 10, 110, 111}. (06 Marks)
- b. What is Kraft-McMillan inequality? Prove that, if a code is uniquely decodable, the codeword lengths have to satisfy the inequality. (06 Marks)
- c. Explain the different types of mathematical models. (08 Marks)
- 2 a. Explain uniform quantizer and obtain the SNR in dB for the uniform quantization of a uniformly distributed source. (10 Marks)
- b. Explain the vector quantization procedure. What are the advantages of vector quantization over scalar quantization? (10 Marks)
- 3 a. How to find predictor coefficients in DPCM system? (10 Marks)
- b. What is delta modulation? Describe the two types of delta modulation techniques to adopt the step size. (10 Marks)
- 4 a. What is Karhunen-Loeve transform? Explain. (10 Marks)
- b. Explain JPEG image compression technique. (10 Marks)
- 5 a. Explain the block diagram of sub band coding system. (10 Marks)
- b. Explain G.722 standard used in wide band speech coding signals. (10 Marks)
- 6 a. Explain linear predictor coder. (10 Marks)
- b. Discuss SPIHT algorithm. (10 Marks)
- 7 a. Explain L277 with an example. (10 Marks)
- b. Discuss H.263 algorithm with a block diagram. How it differs from H.261? (10 Marks)
- 8 a. For an alphabet  $A = \{a_1, a_2, a_3, a_4\}$  with probabilities  $P = \{0.1, 0.3, 0.25, 0.35\}$ . Find:  
i) A Huffman code using the minimum variance procedure; ii) The average length;  
iii) Its binary tree. (05 Marks)
- b. What is golomb code? Design a golomb code for  $m = 5$ . (05 Marks)
- c. What are the advantages of arithmetic coding over Huffman coding? Explain arithmetic encoding and decoding algorithm. (10 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.