USN | | | | | | | | | | |

10CS/IS663

Sixth Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Data Compression

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain lossy and lossless compression techniques, with examples. **(04 Marks)**

b. How the given code words are tested for unique decidability? Prove that the code {0, 01, 11} is uniquely decodable. **(04 Marks)**

c. What is prefix code? Explain with examples. **(04 Marks)**

d. A source emits a letter from an alphabet A = $\{a_1, a_2, a_3, a_4, a_5\}$ with probability $P(a_1) = 0.15$, $P(a_2) = 0.04$, $P(a_3) = 0.26$, $P(a_4) = 0.05$ and $P(a_5) = 0.50$. i) Calculate the entropy of the source ii) Find the Huffman code iii) Find the average length of the code in (ii) iv) Calculate its redundancy. **(08 Marks)**

2 a. Encode the following sequence, using the LZ78 approach
wabba ♭ wabba ♭ wabba ♭ wabba ♭ woo ♭ woo ♭ woo . **(06 Marks)**

b. Write an algorithm used by CALIC to form the initial prediction and explain this algorithm. **(06 Marks)**

c. How multi resolution approach helps in progressive image transmission? **(04 Marks)**

d. Briefly explain JPEG – Ls standard. **(04 Marks)**

3 a. Explain the various distortion criteria used in lossy compression schemes. **(04 Marks)**

b. What is uniform quantizer? Explain uniform quantization of a uniformly distributed source. **(10 Marks)**

c. Explain adaptive quantization, with examples. **(06 Marks)**

4 a. What is vector quantization? Explain the vector quantization, with a block diagram. **(08 Marks)**

b. Explain LBG algorithm, in detail. **(08 Marks)**

c. Explain the prediction in DPCM. **(04 Marks)**

PART – B

5 a. What are transforms? Explain DCT with suitable diagram. Mention its advantages. **(10 Marks)**

b. Find the inverse Z – transform of $f(z) = \dfrac{2z^4 + 1}{2z^3 - 5z^2 + 4z - 1}$. **(04 Marks)**

c. Explain discrete Fourier transformation (DFT). **(06 Marks)**

6 a. What is filter? Discuss the FIR and IIR filters. **(04 Marks)**

b. Explain the basic subband coding algorithm. **(08 Marks)**

c. Explain the MPEG audio coding algorithm with a suitable diagram. Also explain the frame structure of Layer II coding. **(08 Marks)**

7 a. With a neat diagram, explain the SPIHT algorithm. **(07 Marks)**

b. Explain embedded zero tree coder, with examples. **(08 Marks)**

c. Explain the use of wavelets in image compression, with a neat sketch. **(05 Marks)**

8 a. Explain the various representation of video signals. **(06 Marks)**

b. Consider the following 4 × 4 image

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

Apply loop filters of H·261 coding algorithm. **(06 Marks)**

c. With a neat block diagram, explain ITU – T recommendation H·263 video compression. **(08 Marks)**

* * * * *