USN | | | | | | | | | | **10CS/IS663**

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Data Compression

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Define Data Compression. With an example, explain the process of modeling and coding. **(06 Marks)**
   b. Verify if the code {0, 10, 101, 001, 110, 1110} is uniquely decodable. **(04 Marks)**
   c. A source emits letters from an alphabet t = {a_1, a_2, a_3, a_4, a_5} with probabilities $P(a_1)$ = 0.15, $P(a_2)$ = 0.04 , $P(a_3)$ = 0.26 , $P(a_4)$ = 0.05 and $P(a_5)$ = 0.50. Entropy = 1.818 bits. Calculate
   i) Huffman codes using minimum variance procedure   ii) Average length
   iii) Redundancy. **(10 Marks)**

2 a. Explain in detail, the coding schemes used in group – 3 facsimile apparatus. **(10 Marks)**
   b. Write a note on JPEG – LS standard. **(06 Marks)**
   c. Explain Run Length coding. **(04 Marks)**

3 a. What is Distortion? Discuss different ways to measure distortion. **(05 Marks)**
   b. Explain two types of Adaptive quantization. **(08 Marks)**
   c. Show that SNR of uniform quantizer of a uniformly distributed source is 6.02n dB. **(07 Marks)**

4 a. What is Vector Quantization? Explain the quantizer, with a block diagram. **(08 Marks)**
   b. Explain Delta Modulation. **(08 Marks)**
   c. Explain the prediction in DPCM. **(04 Marks)**

PART – B

5 a. Describe the properties of a linear system. Also explain time invariance and transfer function of the linear system. **(08 Marks)**
   b. What are Transforms? Explain DCT with suitable diagram. Mention its advantages. **(08 Marks)**
   c. Find the inverse Z – transform of
   $$F(z) = \frac{6z^2 - 9z}{z^2 - 2.5z + 1}.$$ **(04 Marks)**

6 a. Illustrate the basic sub band coding algorithm, with its block diagram. **(08 Marks)**
   b. Explain how image compression is done using sub band coding. **(06 Marks)**
   c. What is Filter? Discuss the FIR and I I R filters. **(06 Marks)**

7 a. Explain multi resolution analysis and scaling function, with an example. **(08 Marks)**
   b. Explain Image compression using wavelets. **(05 Marks)**
   c. With a neat diagram, explain SPIHT scheme. **(07 Marks)**

8 a. Explain H.264 advanced video coding. **(07 Marks)**

b. Consider the following 4 × 4 image :

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

(06 Marks)

Apply loop filers of H.261 coding algorithm.

c. Explain with diagram, MPEG – 1 video standard. **(07 Marks)**

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