USN ☐☐☐☐☐☐☐☐☐☐

Sixth Semester B.E. Degree Examination, June/July 2017
Data Compression

Time: 3 hrs.
Max. Marks:100

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

PART – A

1 a. What is data compression? Explain Markov model and composite source model. **(08 Marks)**

   b. A source emits letters from an alphabet A $\{a_1, a_2, a_3, a_4, a_5\}$ with probabilities. $P(a_1) = 0.15$, $P(a_2) = 0.04$, $P(a_3) = 0.26$, $P(a_4) = 0.05$, $P(a_5) = 0.50$.
      i) Calculate entropy for the source
      ii) Find Huffman code for this source
      iii) Find average length of Huffman code and hence its redundancy. **(12 Marks)**

2 a. Explain:
      i) GIF and PNG compression
      ii) CALIC scheme for lossless image compression. **(10 Marks)**

   b. A sequence is encoded using LZW algorithm and the initial dictionary is given below.

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      i) The output of the LZW encoder is 1, 1, 2, 6, 1, 3, 7, 9, 11, 4, 5. Decode the sequence.
      ii) Verify the decoded sequence by encoding it using the same initial dictionary. **(10 Marks)**

3 a. What is a Distortion criterion? Explain. **(08 Marks)**

   b. What is quantization? Explain :
      i) Uniform Quantizer
      ii) Adaptive Quantization. **(12 Marks)**

4 a. What is a code book vector? Discuss briefly vector Quantization with the help of block diagram. List some advantages of vector quantization. **(10 Marks)**

   b. Discuss :
      i) Prediction in DPCM
      ii) Speech coding
      iii) Image coding **(10 Marks)**

PART – B

5 a. What is sampling? Explain discrete Fourier transform. **(10 Marks)**

   b. Find the inverse z-transform of $F(z) = \dfrac{6z^2 - 9z}{z^2 - 2.5z + 1}$. **(05 Marks)**

   c. Write the steps involved in JPEG compression. **(05 Marks)**

6 a. What is subband coding? Explain the basic subband coding algorithm with relevant figures.

(10 Marks)

b. Discuss :
   i) MPEG Audio coding
   ii) DOLBY AC3 Algorithm.

(10 Marks)

7 a. Bring out the differences between wavelet transforms and Fourier transforms. **(05 Marks)**

b. Discuss multi resolution analysis (MRA) with an illustration. **(10 Marks)**

c. Write a note on hierarchical trees. **(05 Marks)**

8 a. Explain motion compensation with an example. **(08 Marks)**

b. Explain :
   i) Asymmetric wire frame model
   ii) MPEG – I standard for video compression
   iii) H.264 standard.

(12 Marks)

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