Total No. of Questions : 5] *[Total No. of Printed Pages : 2*

Roll No .....

EC - 7012

B.E. VII Semester

Examination, December 2015

Digital Image Processing

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) What are the fundamental steps in Image processing?
   b) What is brightness adaptation?
   c) What is sampling and quantization?
   d) Describe in detail about the elements of digital image processing system.

   OR

   Explain any four basic relationships between pixels.

2. a) What are the properties of the optimum mean square quantizer?
   b) Explain Gray Level Transformation functions.
   c) Write the properties of cosine transform.
   d) Describe one dimensional and two-dimensional discrete Fourier Transform?

   OR

   Explain K-L transform in detail.

3. a) What is spatial domain method?
   b) Specify the objective of image enhancement technique.
   c) Name the different types of derivative filters.
   d) Show that a high pass filtered image can be obtained in the spatial domain as High pass = Original – Low pass.

   OR

   Determine the frequency characteristics of low pass, high pass and Homomorphic filtering in frequency domain.

4. a) What is meant by Noise probability density function?
   b) Give the difference between Enhancement and Restoration?
   c) List the properties involved in Degradation model.
   d) Describe constrained least square filtering for image restoration and derive its transfer function.

   OR

   How wiener filtering is helpful to reduce the mean square error? Explain with a suitable example.

5. a) What are the basic steps in JPEG?
   b) What are the operations performed by error free compression?
   c) Write short notes on Run length encoding and Shift codes.
   d) A source emits letters from an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1) = 0.2$, $P(a_2) = 0.4$, $P(a_3) = 0.2$, $P(a_4) = 0.1$ and $P(a_5) = 0.1$
      i) Find a Huffman code for this source.
      ii) Find the average length of the code and its redundancy.

   OR

   Describe Minimum Perimeter Polygon algorithm (MPP) in detail.

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