IT 472 – Digital Image Processing

Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT)

Second In-Sem Examination, March 2019

[Time – 2 Hour]
[Total Marks - 45]

Instructions:

- **Calculators are allowed in examination.**
- **All questions are self-explanatory and understanding of question is a part of evaluation. No query regarding questions will entertained during examination by course instructor or invigilator.**

Section A

Multiple choice question (Write the most appropriate answer in answer sheet)
[5 x 1 = 5 Marks]

1. To map a narrow range of low gray-level input image into a wider range of output levels, we use
   a) Log Intensity Transformation Function
   b) Power-law Intensity Transformation Function
   c) Inverse Log Intensity Transformation Function
   d) Identity Intensity Transformation Function

2. MRI Technology used -------- band
   a) Gamma Rays b) CT Scan
   c) Visible d) Radio waves

3. The colormap array of the indexed image is always of class
   a) uint8 b) uint16
   c) double d) logical

4. What are the basic quantities that are used to describe the quality of a chromatic light source?
   a) Radiance, brightness and wavelength
   b) Brightness and luminence
   c) Radiance, brightness and luminence
   d) Luminence and radiance

5. What is the set of pixels of 8-neighbors of pixel p at coordinates (x, y)?
   a) (x+1, y), (x-1, y), (x, y+1), (x, y-1), (x+2, y), (x-2, y), (x, y+2), (x, y-2)
   b) (x+1, y), (x-1, y), (x, y+1), (x, y-1), (x+1, y-1), (x+1, y-1), (x-1, y+1), (x-1, y-1)
   c) (x+1, y+1), (x+1, y-1), (x-1, y+1), (x-1, y-1), (x+2, y+2), (x+2, y-2), (x-2, y+2), (x-2, y-2)
   d) (x+2, y), (x-2, y), (x, y+2), (x, y-2), (x+2, y+2), (x+2, y-2), (x-2, y+2), (x-2, y-2)

Section B
[5 x 2 = 10 Marks]

6. Give the formula for calculating 4-*D* (city block distance) and 8-*D* distance (chess board distance).
7. Why Power law transformation is more versatile than log transformation?
8. Differentiate between Image Enhancement and Restoration.
9. State Weber ratio? Explain its role in Image Processing.
10. What is meant by Mach band Effect?

Section C
[3 x 10 = 30 Marks]

11. Consider an image whose intensity values are integers from 0 to 7, occurring with frequencies 0.1, 0.1, 0.2, 0.2, 0.2, 0.15, 0.025, 0.025 respectively (note: there are 8 intensity values). Find Entropy value, construct a Huffman tree for encoding these intensity values, and find the corresponding average bit length (exact numerical values are not important, but show your steps clearly).

12. (A) Let the RGB Values of a point be (0.4, 0.6, 0.8). Find the HSI equivalent of RGB. Also verify whether the original point can be obtained by the inverse transform from HSI to RGB.
(B) Let the RGB Values of a point be (0.3, 0.8, 0.5). Find the YIQ equivalent of RGB.

13. What do you mean by Histogram Equalization? Discuss in detail about the procedure involved in Histogram Matching. Perform Histogram Equalization for the 8 X 8 image shown in the table.