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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; June - 2016

Digital Image Processing

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each **unit**.*
ii) Assume missing data suitably.

UNIT - I

1 a. Discuss the fundamental steps in digital image processing along with block diagram. 10

b. What does $N_D(P)$ and $N_8(P)$ stand for? Explain with an example. 5

c. Explain the term connected set, boundary and region. 5

2 a. Explain the simple image formation model with appropriate equations. 7

b. With a neat labeled diagram, explain image formation in the eyes. 7

c. Find city block Euclidean and chess board distance between the spatial coordinates (0, 0) and (7, 3). 6

UNIT - II

3 a. Explain the process of Histogram equalization and perform Histogram equalization for, 10

$$\begin{bmatrix} 1 & 1 & 1 & 2 & 2 \\ 1 & 2 & 2 & 3 & 3 \\ 1 & 1 & 2 & 2 & 2 \\ 1 & 1 & 3 & 3 & 4 \\ 1 & 1 & 4 & 4 & 5 \end{bmatrix}$$

b. Explain the following process : 10

(i) Image subtraction (ii) Image averaging.

4 a. With a neat block diagram, explain the basic steps of filtering in frequency domain. 6

b. Compare ideal LPF, Butter worth LPF and Gaussian LPF. Mention advantages and disadvantages of each. 10

c. With the equations for 2D DFT of an M × N image *f(x, y)* and it's inverse. 4

UNIT - III

5 a. Name the different noise models. Write mean, variance and PDF of any two noise models. 8

b. Write a note on: 6

(i) Band pass filter (ii) Band reject filter

c. Write any three noise model PDF with their Ideal responses. 6

6 a. Write a role on the following with equations, 8

(i) Median (ii) Max min

(iii) Mid-point (iv) Alpha trimmed.

Contd…2

b.	Analyze the process of minimum man square error filtering.	6
c.	Explain the performance of mean filters on salt pepper noise.	6

UNIT - IV

7 a.	Explain the following : (i) Line detection (ii) Edge detection	8
b.	Mention the steps required for Otsu's algorithm.	7
c.	List the various methods for image segmentation.	5
8 a.	With an example explain dilation and erosion.	8
b.	Explain the morphological operation opening and closing with an example.	8
c.	List the basic morphological algorithm.	4

UNIT - V

9 a.	Explain any two of the following color model, (i) RGB (ii) CMY (iii) HIS.	10
b.	Write the equations to convert. (i) RGB to HSI (ii) HSI to RGB	10
10 a.	With neat block diagram explain source encoder and source decoder image compressions model.	12
b.	Write a note on : (i) Source coding theorem (ii) Rate distortion theory	8

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