Hall Ticket Number:

Code No.: 22903 M

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.Tech. (CSE: CBCS) II-Semester Make Up Examinations, September-2017

Image Processing

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from Part-B*

Part-A (10 × 2 = 20 Marks)

1. Give two applications of image processing in the X-ray band.
2. Differentiate between 4- and 8- adjacency.
3. Calculate the Fourier transform of an impulse located at origin.
4. Differentiate Fourier series and Fourier transform.
5. What is the difference between line and edge detection?
6. Compute the log transformation for the image $\begin{bmatrix} 2 & 3 & 2 \\ 4 & 10 & 6 \\ 2 & 4 & 3 \end{bmatrix}$
7. Differentiate between lossy and lossless compression. Is JPEG lossy or lossless?
8. Define compression ratio for an image.
9. Why is low-pass filtering done after inverse filtering for image restoration?
10. Draw the block diagram for image degradation/restoration process.

Part-B (5 × 10 = 50 Marks)

11. a) What are the fundamental steps in image processing? Describe them briefly. [6]
    b) Explain image formation in human eye. [4]

12. a) Compute the DFT of the image, $f(x,y) = \begin{bmatrix} 1 & 4 \\ 2 & 4 \end{bmatrix}$, for $x = 0,1$ *and* $y = 0,1$. [6]
    b) Derive the Fourier transform of the function [4]

$$f(t,z) = \begin{cases} A & if\ -\frac{t}{2} \le T \le \frac{t}{2}\ and\ -\frac{z}{2} \le Z \le \frac{z}{2} \\ 0 & otherwise \end{cases}$$

13. a) What is the role of convolution in spatial enhancement of images? [5]
    b) Explain the isolated point detection method used for segmentation. [5]

14. a) Explain Huffman coding with an example. [5]
    b) How objective fidelity criteria is used to measure information loss in compression process. [5]

15. a) Describe Weiner filter for image restoration. [5]
    b) Explain how the degradation function is estimated. [5]

16. a) What is the difference between sampling and quantization? [4]
    b) Compute the DCT for the function f*(x)* = {1,2,4,0} for x = 0,1,2,3. [6]

17. Write short notes on any ***two*** of the following:
    a) Histogram equalization [5]
    b) Redundancies in an image [5]
    c) Estimation of noise parameters. [5]