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Code No.: 9213 M

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.Tech. I Year (CSE) II-Semester (Make Up) Examinations, August-2016

Image Processing

Time: 3 hours

Max. Marks: 70

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

Part-A (10 X 2=20 Marks)

1. Differentiate photopic and scotopic vision.
2. Find the number of bits required to store a 256 X 256 image with 32 gray levels.
3. Find DCT transform of a given 2 x 2 image $\begin{bmatrix} 3 & 6 \\ 6 & 4 \end{bmatrix}$.
4. What is the Walsh-Hadamard transform?
5. What is an 'edge' in an image? What are the mathematical operations used for edge detection?
6. What is the region splitting and merging operation in image segmentation?
7. Describe the Fidelity Criteria.
8. What is the role of encoder and decoder in a digital image data compression system?
9. Draw the block diagram of image restoration model.
10. List the different Noise Models.

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) What are the fundamental steps involved in digital image processing? How an image is acquired?
b) Explain the application of X-ray imaging in image processing.
12. a) The image $f(m,n)$ is given below. What will be the value of $F(0,0)$ and explain its importance.

$$\begin{bmatrix} 0 & 1 & 2 & 1 & 4 \\ 4 & 1 & 4 & 5 & 6 \\ 1 & 2 & 1 & 0 & 4 \\ 5 & 4 & 1 & 3 & 5 \\ 4 & 2 & 4 & 5 & 6 \end{bmatrix}$$

- b) Describe the image smoothing and sharpening operations in frequency domain.
13. a) State and explain various methods to find point, line and edges in the image.
b) Write algorithm to compute basic global threshold value and dynamic thresholding value.
14. a) Explain the Huffman encoding with suitable example. Calculate the compression ratio.
b) Derive forward and inverse transformations of KL-transform.
15. Describe constrained least square filtering for image restoration and derive its transfer function.
16. a) Describe the Sampling and Quantization techniques with neat diagram.
b) What is the significance of 2D-DFT and what are the properties of 2D-DFT? Prove the linearity of 2D-DFT.
17. Write short notes on any *two* of the following:
 - a) Run length coding
 - b) Spatial averaging masks
 - c) Inverse Filtering.