

Total No. of Questions : 10]

SEAT No. :

P1866

[4859]-1050

[Total No. of Pages : 3

B.E. (Electronics)

IMAGE PROCESSING AND MACHINE VISION

(2012 Course) (End Sem.) (404204 A) (Semester - I) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10 .
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

- Q1)** a) Explain how uniform sampling and quantization is used in image digitization. Explain gray level resolution. What is false contour effect?[6]
- b) Explain connectivity and adjacency between the pixels. Where the concept of connectivity is used in Image Processing. [4]

OR

- Q2)** a) Define: [6]
- i) Connected Set.
 - ii) Region of the image and boundary of the region.
 - iii) Euclidean distance between pixels $p(x, y)$ and $q(s, t)$.
- b) Explain how the forward and inverse 2D Discrete Fourier Transform (DFT) is computed? [4]

- Q3)** a) Explain how the Laplacian mask is designed? Comment on the resultant image after applying Laplacian? What do you mean by High boost filtering? [6]
- b) Explain the following methods of image enhancement in spatial domain:[4]
- i) Contrast Stretching.
 - ii) Bit plane slicing.

OR

P.T.O.

Q4) a) Gray level histogram of three bit image is given below. [6]

Gray Level	0	1	2	3	4	5	6	7
Frequency	123	78	281	417	639	1054	816	688

Perform Histogram equalization and write gray histogram of equalized image.

b) Compare Discrete Cosine Transform (DCT) and Discrete Fourier Transform (DFT). [4]

Q5) a) What is image segmentation? What are the different approaches of image segmentation? Explain different edge detection approaches used in segmentation. [8]

b) What is the role of illumination in segmentation by thresholding? Explain Optimal thresholding technique. [8]

OR

Q6) a) Explain in detail region splitting and merging technique used in image segmentation. [8]

b) Explain how Hough transform is used after edge detection in joining straight lines. [8]

Q7) a) Explain the following with respect to compression: [8]

i) Compression ratio.

ii) Coding redundancy.

iii) Interpixel redundancy.

iv) Psycho-visual redundancy.

b) With the help of suitable block diagram explain the process of image encoding and decoding in JPEG image compression standard. [10]

OR

- Q8)** a) Generate an optimal Huffman code for source emitting pixels with probability given below $p_1 = 0.1$ $p_2 = 0.4$ $p_3 = 0.06$ $p_4 = 0.1$ $p_5 = 0.04$ $p_6 = 0.3$ Calculate average bits/symbol. [10]
- b) Explain the meaning of objective Fidelity criteria and subjective Fidelity in terms of image compression. Explain any one metrics used for measurement of objective and Subjective fidelity of the compressed image. [8]
- Q9)** a) What is image restoration? What is the difference between image restoration and image enhancement? Explain with block diagram the image degradation/restoration process model. [8]
- b) Explain with suitable block diagram, fingerprint based security system. Which fingerprint features are used for matching? [8]

OR

- Q10)** a) What the different techniques used to estimate the degradation models in image restoration? [8]
- b) Explain the principle of multispectral satellite imaging? List the applications of multispectral satellite image processing. [8]

