SPECIAL SUPPLE B.TECH/IT/7TH SEM/INFO 4102/2018

IMAGE PROCESSING
(INFO 4102)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Which of the following fails to work on dark intensity distributions?
(a) Histogram equalization (b) Laplacian transformation
(c) Gaussian transformation (d) Power law transformation.

(ii) Intensity range of 8---bit pixel image is
(a) 0 to 15 (b) 0 to 127
(c) 0 to 255 (d) 0 to 256.

(iii) The initial step in any image processing technique is__________.
(a) segmentation (b) masking
(c) image acquisition (d) normalization.

(iv) The raw data having consecutive 10 ‘A’s will gain minimum compression using
(a) RLE (b) LZW Encoding
(c) Huffman Encoding (d) all will have same compression ratio.

(v) Image compression is
(a) making image look better
(b) sharpening the intensity---transition regions
(c) minimizing degradation over image
(d) reducing the redundancy of the image data.

(vi) Which image processing technique is used to improve the quality of image for human viewing?
(a) Compression (b) Enhancement
(c) Restoration (d) Analysis.

(vii) Which of the following is a type of predictive coding?
(a) Differential Coding (b) Huffman Encoding
(c) Transform Coding (d) Entropy Coding.

(viii) Butterworth filter has ____________________ transition.
(a) peak (b) random
(c) smooth (d) sharp.

(ix) _____________ has number of peaks.
(a) Log transformation (b) Multimodal histogram
(c) Power law transformation (d) Intensity transformation.

(x) An image is considered to be a function of a(x, y) where a represents _________.
(a) height of image (b) width of image
(c) amplitude of image (d) resolution of image.

Group – B

2. (a) Write a brief note about the components of image processing system.

(b) Write short notes on sampling and quantization.

6 + 6 = 12

3. What is histogram? Describe histogram equalization with suitable example.

(2 + 10) = 12

Group – C

4. (a) With a block diagram explain the image model of degradation.

(b) Define 2-D DFT. Explain the following properties of 2D DFT:
(i) Translation
(ii) Rotation.

6 + (2 + 4) = 12

5. (a) Give the expression for 2-D ILPF, BLPF & GLPF functions and sketch them. Explain their usefulness in Image enhancement.

(b) Compare the characteristics of Low pass and High pass filters in image enhancement in frequency domain.

6 + (3 + 3) = 12

Group – D

6. (a) Draw the flowchart for describing the steps followed during LZW algorithm.

   (b) Apply LZW algorithm to encode the raw data CCCDDDCCCDDDCCDDCCDD. Find out the compression ratio.

   (c) "LZW is a statistical lossless compression algorithm" – Justify this statement.

6 + 3 + 3 = 12

7. (a) Draw the flowchart to explain Transform Coding.

   (b) Explain Huffman Coding with suitable example.

6 + 6 = 12

Group – E

8. With suitable example, explain Global processing via the Hough Transform for edge linking.

12

9. What is thresholding? Explain global thresholding. Explain basic adaptive thresholding process used in image segmentation.

(2 + 4 + 6) = 12