

B.TECH. DEGREE EXAMINATION, MAY 2014**Seventh Semester**

Branch : Electronics and Communication Engineering

EC 010 706 (L) 03—DIGITAL IMAGE PROCESSING (Elective II) [EC]

(Improvement/Supplementary—2010 admissions)

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 3 marks.*

1. Name different classes of Digital Images.
2. Define 2D-DFT. List its properties.
3. Name the role of point operators in image enhancement.
4. Mention the uses of derivative operation in edge detection.
5. Give an example of runlength coding.

(5 × 3 = 15 marks)

Part B*Answer all questions.**Each question carries 5 marks.*

6. Define luminance and brightness of an image.
7. What is the special feature of KL transform.
8. What are digital negatives ? Mention the use of it.
9. What are gradient operators ? Explain its use in edge detection.
10. Sketch the block diagram of the encoders used in lossy and lossless predictive coding.

(5 × 5 = 25 marks)

Part C*Answer all questions.**Each question carries 12 marks.*

11. (a) State and prove 2D-sampling theorem.

Or

Turn over

(b) Explain the following :

- (i) Aliasing in band limited images.
- (ii) Image quantization.
- (iii) Elements of visual perception.

12. (a) (i) Construct Haar transform for $N = 4$.

(ii) Find 8-point DCT of the following data :

$$X = \{2, 4, 6, 8, 10, 6, 4, 2\}$$

Or

(b) Find KL transform to express co-variance matrix C_X , Eigen values $\lambda_1, \lambda_2, \lambda_3$ transformation matrix A_X and covariance matrix C_Y of the transformed vectors, for the given data :

$$X = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

13. (a) (i) Explain non-linear noise cleaning procedure and describe how it provides better trade-off between noise smoothing, while retention of fine image details, compared to linear processing techniques.

(ii) What is a median filter ? Explain its operation on a 2D-noisy image with uniform noise.

Or

(b) (i) List different histogram image enhancement techniques. Explain each one in detail.

(ii) Write a technical note on colour image enhancement.

14. (a) (i) What is clustering ? Explain its role in the feature extraction of multi featured images.

(ii) With block diagram, explain Coleman-Andrews clustering image segmentation process.

Or

(b) Explain the following algorithms used for edge linking :

(i) Hough transform.

(ii) Greedy algorithm and loop free algorithm for segmentation.

15. (a) (i) Differentiate between lossy and lossless image compression standards.

(ii) Using block diagram, explain the working of vector quantization.

Or

(b) Explain the following image compression standards :

(i) JPEG standards.

(ii) MPEG-1, MPEG-2, MPEG-4 and MPEG-7.

(5 × 12 = 60 marks)