Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71414

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Seventh Semester

Electronics and Communication Engineering

EC 2029/EC 708/10144 ECE 41 — DIGITAL IMAGE PROCESSING

(Regulation 2008/2010)

(Common to 10144 ECE 41 – Digital Image Processing for B.E. (Part-Time) Seventh Semester – ECE – Regulation 2010)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define simultaneous contrast and mach band effect.

2. Define brightness and contrast.

3. Give the PDF of uniform noise and sketch it.

4. Define and give the transfer function of Mean and Geometric Mean filter.

5. Define image degradation model and sketch it.

6. Define Geometric transformation.

7. Write the properties of first order and second order derivative.

8. Define local thresholding for edge detection.

9. State the need for data compression and compare lossy and lossless compression techniques.

10. List the advantages of transform coding.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe how the image is digitized by sampling and quantization and explain about checker board effect and false contouring with neat sketch. (8)

(ii) Find Discrete Cosine Transform and its inverse for the following image data. [0255; 2550] [2 × 2] matrix. (8)

Or

(b) Obtain Discrete Fourier transform for the given vectors. Input image matrix = [0 0; 255 255] [2 × 2] matrix. Also analyze how the Fourier transform is used if the image is rotated or translated. (16)

12. (a) Describe histogram equalization. Obtain Histogram equalization for the following 8 bit image segment of size 5 × 5. Write the inference on image segment before and after equalization. (16)

200 200 200 180 240

180 180 180 180 190

190 190 190 190 180

190 200 220 220 240

230 180 190 210 230 (5 × 5) matrix.

Or

(b) (i) Describe how homomorphic filtering is used to separate illumination and reflectance component. (8)

(ii) How color image is enhanced and compare it with grayscale processing? (8)

13. (a) Describe inverse filtering for removal of blur caused by any motion and describe how it restore the image. (16)

Or

(b) How wiener filter is helpful to reduce the mean square error when image is corrupted by motion blur and additive noise?

14. (a) (i) How do you link edge pixels through Hough transform? (8)

(ii) Describe Watershed segmentation algorithm. (8)

Or

(b) (i) Explain region based segmentation and region growing with an example. (8)

(ii) Discuss how to construct dams using morphological operations. (8)

15. (a) (i) Describe vector quantization with neat sketch. (8)

(ii) A source emits letters from an alphabet A = (a1, a2, a3, a4, a5} with probabilities P(a1) = 0.3, P(a2) = 0.4, P(a3) = 0.15, P(a4) = 0.05 and P(a5) = 0.1. (8)

(1) Find a Huffman code for this source?

(2) Find the average length of the code and its redundancy?

Or

(b) (i) Describe run length encoding with examples. (8)

(ii) How an image is compressed using JPEG Image compression with an image matrix? (8)
