LIB
3/12/13 FN

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

Question Paper Code : 31331

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Electronics and Communication Engineering

EC 2029/EC 708 — DIGITAL IMAGE PROCESSING

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the difference between a monochrome and a grayscale image.

2. State two important properties of unitary transforms.

3. What is a bit plane?

4. State how contrast adjustment can be done in an image.

5. List any two properties of a median filter.

6. Mention the drawbacks of inverse filtering.

7. Mention two applications of image segmentation techniques.

8. Write the importance of Edge detection.

9. Distinguish between scalar and vector quantization.

10. Mention the limitations of Huffman coding.

PART B — (5 × 16 = 80 marks)

11. (a) State and prove convolution property of 2D–FFT. (16)

Or

(b) Determine the DCT matrix for N = 4. (16)

12. (a) Illustrate the steps in histogram equalization of the image. (16)

$$\begin{bmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{bmatrix}$$

Or

(b) With the help of a block diagram, discuss the principle of homomorphic filtering. (16)

13. (a) Illustrate the different causes of image degradation.

Or

(b) A blur filter h(m,n) is given by $\begin{vmatrix} 0.1 & 0.1 & 0.1 & 0 \\ 0.1 & 0.1 & 0.1 & 0.1 \\ 0.05 & 0.1 & 0.1 & 0.05 \\ 0 & 0.05 & 0.05 & 0 \end{vmatrix}$.

Find the deblur filter using inverse filtering.

14. (a) Discuss the principle of image segmentation by watershed transformation and explain its drawbacks. (16)

Or

(b) Discuss image segmentation based on various thresholding techniques. (16)

15. (a) For the image shown below compute the compression ratio that can be achieved using Huffman coding. (16)

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

Or

(b) A source emits three symbols A,B,C with a probability {0.5,0.25,0.25} respectively. Construct an arithmetic code to encode the word 'C A B'.