

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code : 51139**

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

Eighth Semester

Electronics and Communication Engineering

CS 1002 — DIGITAL IMAGE PROCESSING

(Common to Sixth Semester Electronics and Communication Engineering and Seventh Semester Information Technology and Computer Science and Engineering)

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the two processes involved in converting a continuous data into digital form?
2. State convolution theorem.
3. What is meant by spatial filtering?
4. Define histogram.
5. What is Fredholm integral of first kind?
6. What are the three methods of estimating the degradation function?
7. How do you classify redundancy in images?
8. What is the role of quantisation matrix in JPEG image compression?
9. What are the properties of second derivative around an edge?
10. What are the difficulties in region growing?

PART B — (5 × 16 = 80 marks)

11. (a) (i) How is an image sampled at different rates? Discuss its influence on the size of the image. (8)
- (ii) Give the forward and inverse 2D DCT transform kernels and enumerate the uses of DCT. (8)

Or

- (b) (i) Describe the principle of visual perception and its analogy in DIP. (8)
- (ii) Compute the 2D DFT of the (4 × 4) gray scale image. (8)

$$f(x, y) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

12. (a) (i) Explain the different types of piecewise-linear transformation functions. State the advantages and disadvantages of piecewise linear transformation. (10)
- (ii) Describe the process of image subtraction. (6)

Or

- (b) Explain smoothing in frequency domain filters. (16)

13. (a) (i) Explain Noise models. (8)
- (ii) Explain the singular value decomposition. (8)

Or

- (b) Discuss constrained least mean square filtering. (16)

14. (a) (i) Differentiate between lossless and lossy compression and explain transform coding system with a neat diagram. (8)
- (ii) Explain about LZW coding and discuss its properties in detail. (8)

Or

- (b) (i) Explain MPEG compression standard. (8)
- (ii) Explain about wavelet coding with a neat sketch. (8)

15. (a) Describe the techniques of region splitting and merging and its variations. (8+8)

Or

- (b) (i) Illustrate how chain codes are used to represent a boundary based on 4 or 8 — connectivity of the segments. Give an example. (10)
- (ii) What is the need for polygonal approximations? Illustrate the method of finding the minimum perimeter polygons. (6)
-