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Question Paper Code : 21414

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Electronics and Communication Engineering

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

(Regulations 2008/2010)

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

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Mach band effect.

2. Give the transform pair equation of 2D DFT.

3. What is histogram equalization?

4. Define directional smoothing filter.

5. Distinguish between image enhancement and image restoration.

6. What are the various geometric transformations?

7. Give the principle of region growing.

8. What is global thresholding?

9. Define coding redundancy.

10. What is the basic concept of run length coding?

PART B — (5 × 16 = 80 marks)

11. (a) (i) List and explain various elements of a digital image processing system. (8)

(ii) Explain the working principle of a digital camera with a diagram. (8)

Or

(b) (i) Discuss HSI color model in detail. (6)

(ii) Describe various steps involved in the computation of KL transform with equations. How will you use it for data compression? (10)

12. (a) (i) Explain histogram specification technique in detail with equations. (8)

(ii) Discuss the following spatial enhancement techniques

(1) Spatial averaging (4)

(2) Median filtering. (4)

Or

(b) (i) Explain the following filtering techniques:

(1) Geometric mean filter (3)

(2) Harmonic mean filter (3)

(3) Homomorphic filter. (4)

(ii) Describe the basics of color image enhancement. (6)

13. (a) (i) What is inverse filtering? Explain inverse filter with an equation. (8)

(ii) Discuss constrained least square filtering method of restoration in detail. (8)

Or

(b) (i) Explain Wiener filtering with equations. (8)

(ii) Discuss various types of spatial transformations. (8)

14. (a) (i) Describe gradient operators based edge detection method with necessary masks and equations. (8)

(ii) Explain region splitting and merging method of image segmentation. (8)

Or

(b) (i) Explain the procedure to construct the dam for segmentation. (6)

(ii) Discuss watershed segmentation algorithm in detail. (10)

15. (a) (i) Obtain Huffman coding for the source symbols $S = \{S_0, S_1, S_2, S_3, S_4\}$ and the corresponding probabilities $P = \{0.4, 0.2, 0.2, 0.1, 0.1\}$. (7)

(ii) Explain the principle of arithmetic coding with an example. (9)

Or

(b) (i) Explain vector quantization. (8)

(ii) Draw and explain the block diagram of transform coding. (8)