Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : **91375**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

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. Compare RGB and HSI color image models.

2. Write the Kernel for 2D–DCT and how this lead to data compression.

3. What are the possible ways, for adding noise in images?

4. For the following image region, obtain the median filtered output.

72	55	33	65	32	30	21	12
15	20	3	5	18	21	65	30
35	40	34	255	200	17	51	87
0	255	20	100	101	87	59	42
65	32	18	78	86	50	21	11
30	11	8	97	108	129	151	2
68	72	19	37	14	27	50	64
36	202	111	18	26	192	23	63

5. What is Lagrange multiplier? Where it is used?

6. Why blur is to be removed from images?

7. How edges are linked through Hough transform?

8. State the problems in "region splitting and merging" based image segmentation.

9. What is a shift code? How this is used in image analysis?

10. Write the performance metrics for image compression.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write the elements of an image processing system and its working. Describe the working principle of operation of vidicon camera. (8)

    (ii) How do you obtain the 2D-DFT for a digital image? Discuss about the time complexities. (8)

Or

    (b) (i) What is visual perception model and explain. How this is analogous to a DIP system. (8)

    (ii) When do you prefer non-uniform sampling and quantization? Justify. (8)

12. (a) (i) Write the salient features of image histogram. What do you infer?(8)

    (ii) Explain any two techniques for color image enhancement. (8)

Or

    (b) (i) How do you perform directional smoothing, in images? Why it is required? (8)

    (ii) What is geometric mean and harmonic mean with reference to an image? What purpose do they serve for image analysis? Discuss. (8)

13. (a) (i) Describe how image restoration can be performed for black and white binary images. (8)

    (ii) Compare restoration with image enhancement. (8)

Or

    (b) (i) What is Weiner filtering approach? How this is used for image restoration? Describe. (8)

    (ii) What are the performance measures for ascertaining the adequacy of image restoration? (8)

14. (a) (i) How edge detection is performed in digital images using

    (1) Laplacian operator (2)

    (2) Sobel operator and (2)

    (3) Prewitt operator and compare their out comes. (2+2)

    (ii) Write morphological concepts applicable for image processing. (8)

Or

(b) (i) What is meant by optimal thresholding? How do you obtain the threshold for image processing tasks? (8)

    (ii) Describe watershed segmentation algorithm and compare with region based approaches. (8)

15. (a) (i) Discuss the need for image compression. Perform Huffman algorithm for the following intensity distribution, for a 64×64 image. Obtain the coding efficiency and compare with that of uniform length code. (8)

$$r_0 = 1008$$
$$r_1 = 320$$
$$r_2 = 456$$
$$r_3 = 686$$
$$r_4 = 803$$
$$r_5 = 105$$
$$r_6 = 417$$
$$r_7 = 301$$

    (ii) What is arithmetic coding? Illustrate. (8)

Or

(b) (i) Explain the procedure for obtaining Run Length Coding (RLC). What are the advantages if any? (8)

    (ii) Write short notes on

    (1) Vector Quantization (4)

    (2) JPEG Standard. (4)

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