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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2013

ELECTRONICS AND COMMUNICATION ENGINEERING

SECOND SEMESTER

EC 522 DIGITAL IMAGE PROCESSING

(Regulation 2004)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Let $v = \{0, 1\}$, compute D_4 , D_8 and D_m distances between p and q

$1(p)$	1	2	3
0	2	2	1
1	1	0	2
2	1	2	$1(q)$

2. Define subjective brightness and simultaneous contrast.
3. Write the separability property of 2D – DFT
4. Write the applications of wavelet transform
5. What is high boost filter? Write the use of it.
6. Give the masks used for detecting horizontal, vertical and $\pm 45^\circ$ slanting lines.
7. Draw the image degradation model
8. Compare gradient and laplacian operator
9. Write the need for compression and List the various compression techniques available
10. Write about MPEG – 1 audio compression standard

PART-B (5 x 16 = 80 Marks)

11. (i). Find the set of code words and average word length using Huffman coding scheme for a set of input gray levels with probabilities as given below. (8)

Input	S1	S2	S3	S4	S5	S6	S7	S8
Probability	0.02	0.15	0.03	0.15	0.05	0.20	0.10	0.30

(ii). Explain about block truncation coding (8)

12. a. (i). With a neat block diagram, explain the various steps involved in digital image processing. (10)

(ii). What is Mach band effect (6)

(or)

12. b. (i). Explain 2D-sampling (10)

(ii). What is Photopic and Scotopic vision? (6)

13.a. Compute DCT for the subimage of size 3 x 3

20	30	40
	20	35 45
	30	70 70

(or)

13. b.(i). Write the 2D Hadamard transform and determine Hadamard matrix of order 4 (8)

(ii). Determine the convolution of $x(m,n)$ with $h(m,n)$, where $x(m,n)$ and $h(m,n)$ are as follows: (8)



14. a. Explain the various spatial domain filtering approaches for image enhancement.

(or)

14.b. (i). A 4 x 4 original image is given below, Apply Histogram equalization to the image by rounding the resulting image pixels to integers (8)

10	12	8	9
10	12	12	14
12	13	10	9
14	12	10	12

(ii). Derive Wiener filter for image restoration using the minimum mean-square Approach. (8)

15. a. (i). Describe the region growing technique for image segmentation and mention the problems associated with it. (8)

(ii). Describe, how an image is segmented using split and merge technique in association with region and adjacency graph (8)

(or)

15.b. Explain multilayer feed forward neural network and also explain how to train the neural network by back propagation