Total No. of Questions :8]

SEAT No. : ____

P2342

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[4937] - 201

M.Sc. (Computer Science)

CS - 201 : DIGITAL IMAGE PROCESSING

(Semester - II) (2011 Pattern) (New)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Attempt Any four from the remaining.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Figures to the right indicate full marks.***
6) ***All questions carry equal marks.***

Q1) Attempt ALL: **[8×2=16]**

a) What do you mean by intensity or gray level of the image?

b) When you enter a dark theater on a bright sunny day, it takes an appreciable interval of time before you can see well enough to find an empty seat. Which of the visual processes play an important role in this situation?

c) What do you mean by gamma correction?

d) Write 2 - D continuous Fourier Transform pair.

e) What are the principal sources of noise in digital images?

f) Write 2 properties of opening operation.

g) Write 2 approaches used for segmentation.

h) What is Freeman chain code?

P.T.O.

Q2) a) Consider the two image subsets, S_1 and S_2 shown in the following figure. For V = {1}, determine whether these two subsets are

i) 4 - adjacent

ii) 8 - adjacent, or

iii) m - adjacent

	S_1				S_2				
0	0	0	0	0	0	0	1	1	0
1	0	0	1	0	0	1	0	0	1
1	0	0	1	0	1	1	0	0	0
0	0	1	1	1	0	0	0	0	0
0	0	1	1	1	0	0	1	1	1

b) Write various applications of digital image processing.

c) Obtain a single intensity transformation function for spreading the intensities of an image so that the lowest intensity is 0 & the highest is L - 1.**[8+4+4=16]**

Q3) a) Consider the following 1 - D sequences:

i) f = {2 1 1 1}

ii) g = { 0 –1 0 1}

Check whether f and g are even or odd.

b) Give the condition (s) under which the D4 distance between two points p and q is equal to the shortest 4 - path between these points.

c) Give PDF for uniform noise and Impulse noise.

[8+4+4=16]

Q4) a) Given a 3 - bit image of size 64×64 pixels having intensity distribution as shown in the table given below. Apply histogram equalization technique to build output (processed) image.

r_k = (0.....7)

h_k = (790, 1023, 850, 656, 329, 245, 122, 81).

b) Obtain equations for bandpass filters.

c) Explain how Boundary (Border) following algorithm works.

[8+4+4=16]

Q5) a) Explain various properties of 2- D discrete Fourier transform.

b) Write steps for unsharp masking and highboost filtering in spatial domain.

c) Explain structural approaches for texture description.

[8+4+4=16]

Q6) a) Give step-by-step procedure for obtaining g(*x, y*) using laplacian in frequency domain on the input image f (*x, y*).

b) Which intensity transformation function should be used to enhance too dark image? Too faint (dull) image?

c) Which derivative is more sensitive to noise? Give fundamental steps for edge detection.

[8+4+4=16]

Q7) a) Prove the following:

i) $(A \ominus B)^c = A^c \oplus \hat{B}$

ii) $(A \oplus B)^c = A \ominus \hat{B}$

b) What is 2 - D Impulse and its sifting property?

c) Which filters are best suitable for the removal of salt - and - pepper noise? Justify.

[8+4+4=16]

Q8) a) Explain the working of following filters. **[8+4+4=16]**

i) Adaptive median filter.

ii) Adaptive, local noise reduction filter.

b) Explain morphological reconstruction by dilation and by erosion with the help of suitable diagram.

c) Give the following filter masks.

i) Roberts cross - gradient operators.

ii) Prewitt masks.

iii) Sobel masks.