Department of Electronics & Communication Engineering

NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA

MID-SEMESTER EXAMINATION Spring 2013

CLASS: B.Tech, 8th sem (EC & EI) TIME: 2 hours

SUBJECT: **Digital Image Processing**

F.M:30

SUBJECT CODE: **EC443**

*Answer any **Three** questions*

Figures in the right hand margin indicate marks

All parts of a question should be answered in one place

This question paper contains 2 pages

		Marks
1	**Answer all (Each carries of marks two) [2*5=10]**	
	(a) What do you know about *8-adjacency* and *m-adjacency* of pixels in an image?	
	(b) Give the *D_4 distance* and also *D_8 distance* between two pixels *p* and *q* with coordinates (x,y) and (s,t), respectively.	
	(c) Define 'Weber ratio' and use it to clearly discuss the term 'brightness discrimination'	
	(d) What is 'gradient operator' and utility of it in digital image processing?	
	(e) Say a digital image of size N-by-N is allowed to use 8192 number of bits for presenting the image. Find the value of N if 256 numbers of quantized levels are used to represent the gray values?	
2	**(a)** What do you know about 'Unsharp masking' and 'High-boost filtering' in the context of image enhancement through spatial processing?	3
	(b) How a Laplacian operator is used for image enhancement through spatial processing?	3
	(c) What is the benefit of using Laplacian operator in 'High-boost filtering' for image enhancement?	1
	(d) Give the mask structure of the above High-boost filter formed using Laplacian operator.	3

3 (a) The gray values of the pixels in an image (3-by-3) are given below. Compute the length of shortest *8-path* and *m-path* between the pixels p and q for V={0,2} 2

2 (q)	1	2
2	2	0
1	2	1
0 (p)	1	1

(b) What do you mean by 'gray-level slicing' and 'bit-plane slicing' in the context of image enhancement? 3

(c) What is the difference in philosophy between the techniques 'histogram equalization' and 'histogram matching' used for image enhancement? 2

(d) Give a flow chart to implement the algorithm for enhancement of a digital image using 'histogram matching' technique 3

Short notes (Each carries of marks two and half) [2.5*4=10]

(a) A digital image

(b) Imaging of a 3-D object using a sensor strip

(c) Image averaging for enhancement of image

(d) Imaging in Ultraviolet band