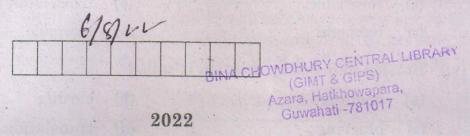
Total No. of printed pages = 3

CSE 1816 PE 31

Roll No. of candidate



B.Tech. 6th Semester End-Term Examination

IMAGE PROCESSING

(New Regulation and New Syllabus)

Full Marks - 70

Time - Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any four from the rest.

1. Answer the following: (MCQ/Fill in the blanks)

 $(10 \times 1 = 10 \text{ marks})$

- (i) How does picture formation in the eye vary from image formation in a camera?
 - (a) Fixed focal length
 - (b) Varying distance between lens and imaging plane
 - (c) No difference
 - (d) Variable focal length
- (ii) A second order derivative operator can be defined as
 - (a) Laplacian

(b) Gaussian

(c) Histogram

- (d) None of the above
- (iii) In wiener filtering it is assumed that noise and image are
 - (a) different

(b) homogeneous

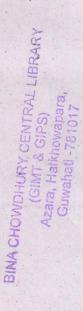
(c) correlated

- (d) uncorrelated
- (iv) What is the main idea behind grey-level slicing?
 - (a) For brightening the relevant grey-valued pixels and preserving the background
 - (b) To give all grey levels of a specific range high value and a low value to all other grey levels.
 - (c) All of the above
 - (d) None of the above

	(V)	11 11	ne pixeis can not be reconstruct	ea wi	thout error mapping is said to be	
		(a)	reversible	(b)	irreversible	
		(c)	temporal	(d)	facsimile	
	(vi)	Erosion followed by dilation is called				
		(a)	opening	(b)	closing	
		(c)	blurring	(d)	translation	
	(vii)	Exa	mple of discontinuity approach	in in	nage segmentation is	
		(a)	edge based segmentation	(b)	boundary based segmentation	
		(c)	region based segmentation	(d)	Both (a) and (b)	
	(viii)		is the starting pixel of	of reg	ion growing process.	
		(a)	seed pixel	(b)	base pixel	
		(c)	original pixel	(d)	image The state of	
	(ix)	The	theory of mathematical morph	ology	is based on	
		(a)	image size	(b)	set theory of the set of	
		(c)	probability	(d)	correlation	
	(x)		ich type of Histogram Proc ancements?	essin	g is suited for minute detailed	
		(a)	Intensive	(b)	Local	
		(c)	Global	(d)	Random	
	(a)	and			age. What will be the different tools ng system? Explain with the help of (7)	
	(b)	Des	cribe the various types of conne	ctivit	y between pixels. Give examples. (4)	
	(c)	Exp	lain any two image interpolatio	n tec	hniques. (4)	
	(a)	Des	cribe about Inverse 2D Discrete	Four	rier Transform. (3)	
	(b)	Con	sider the following 1-D function	'f ar	nd the filter 'w'. (4)	
		f: (00101000			
		w:	14228			
		Illus	strate the 1-D convolution of 'w'	with	f'.	
	(c)	Exp (i) (ii)	lain the smoothing of images in Ideal low pass filters and Butterworth low pass filters	frequ	uency domain using	
			Gaussian Low pass Filters. Al	so ex	plain what is ringing effect. (8)	
100						

4. (a) Given a 3-bit image of size 32×32 pixels having intensity distribution as shown in the table given below, where the intensity levels are in the range 0-7. Apply histogram equalization technique and find the transfer function T(r) which relates input image intensity level r_k to output image intensity level s_k . (5+5 = 10)

Intensity Level	Number of Pixels
$r_0 = 0$	76
$r_1 = 1$	344
$r_2=2$	211
$r_3 = 3$	103
$r_4 = 4$	57
$r_5 = 5$	127
$r_6 = 6$	47
$\mathbf{r}_7 = 7$	59



- (b) What is spatial filtering? Why are smoothing spatial filters used? (5)
- 5. (a) What is the effect of Homomorphic Filtering while enhancing an image? Explain. (5)
 - (b) Various NGOs are working to restore the classical images and paintings. What are the issues involved in restoration of the existing images which may not be in very good condition. (5)
 - (c) An information source produces sequences of independent symbols

 A, B, C, D, E, F, G with corresponding probability 1/3, 1/27, 1/3, 1/9, 1/9, 1/27 and 1/27. Construct a binary code using Huffman coding algorithm. (5)
 - 6. (a) Define the term image coding and its need/Name various image coding techniques and compare and contrast the transform coding from predictive coding technique. (3+4+3 = 10)
 - (b) Compare erosion and dilation with an example. (5)
 - 7. (a) What is wavelet? How can they be used for image compression? (4)
 - (b) Explain the concept of Hit or Miss Transformation. (4)
 - (c) What is thresholding? Describe in brief the various thresholding methods for image segmentation. (7)