

Q.6	Attempt any two:		Total No. of Questions: 6	Total No. of Printed Pages: 4
i.	Explain the differences between lossy and lossless image compression schemes with examples.	5 3 2 5 2		Enrollment No.....
ii.	What is vector quantization in image compression? How does it reduce data redundancy?	5 2 2 5 2		Faculty of Engineering End Sem Examination Dec 2024
iii.	Explain how Huffman coding works as a compression method and provide an example of its application in image compression.	5 3 2 5 2	CS3EA14 Digital Image Processing Programme: B.Tech.	Branch/Specialisation: CSE All Maximum Marks: 60



Knowledge is Power

Duration: 3 Hrs.

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

	Marks	BL	PO	CO	PSO
Q.1 i. Which of the following is NOT a fundamental step in digital image processing?	1	1	1	1,3	1
(a) Image acquisition (b) Image enhancement (c) Image manipulation (d) Image compression					
ii. What is the function of the lens in the human eye?	1	1	1	1	1
(a) To control the amount of light entering the eye (b) To capture color information (c) To focus light onto the retina (d) To transmit electrical signals to the brain					
iii. The Discrete Fourier Transform (DFT) is primarily used in image processing to:	1	2	2	1	1
(a) Compress images (b) Represent images in the frequency domain (c) Convert images to grayscale (d) Smooth images					
iv. Which type of digital image is typically composed of only two values, often representing black and white?	1	2	2	1	1
(a) RGB image (b) Grayscale image (c) Binary image (d) Indexed image					

	[2]		[3]
v.	Which of the following is a smoothing spatial filter? (a) Sobel filter (b) Median filter (c) Laplacian filter (d) Prewitt filter	1 2 3 1 1	Q.2 i. Explain the significance of image acquisition in the context of digital image processing. ii. Describe the structure of the human eye and its importance in visual perception. iii. Outline and describe the fundamental steps in digital image processing.
vi.	The water shade algorithm is mainly used for- (a) Image smoothing (b) Image segmentation (c) Edge detection (d) Noise reduction	1 2 3 1 1	OR iv. Elaborate the different components of an image processing system.
vii.	What is the main purpose of the chromaticity diagram? (a) To represent brightness levels (b) To map color hues and saturation (c) To adjust image contrast (d) To display color edges	1 1 4 1 1	Q.3 i. Define imaging geometry in the context of digital image processing. ii. Explain the concept of separable image transforms with an example. iii. Compare and contrast the slant transform and Karhunen-Loeve transform in terms of applications and efficiency.
viii.	Which color model is mainly used for printing purposes? (a) RGB (b) YIQ (c) CMY (d) HSI	1 1 4 1 1	OR iv. Describe the role of the Discrete Fourier Transform (DFT) in image analysis.
ix.	In image compression, what is the primary purpose of prediction-based compression schemes? (a) To detect edges (b) To reduce file size by estimating pixel values based on neighboring pixels (c) To enhance contrast (d) To increase color depth	1 2 5 1 1	Q.4 i. Briefly explain fuzzy logic in intensity transformations. ii. Explain how the combination of different spatial filter methods can be used for edge detection and image enhancement.
x.	Vector quantization in image compression primarily reduces- (a) Temporal redundancy (b) Chromaticity (c) Spatial redundancy (d) Color depth	1 2 5 1 1	OR iii. Discuss in detail the process of histogram processing and its significance in image enhancement.
			Q.5 i. What is a chromaticity diagram? What information does it provide about colors? ii. Explain the laws of color matching and their role in accurate color representation in digital imaging.
			OR iii. Compare and contrast different color models and discuss their respective applications in color image processing.

Marking Scheme
CS3EA14 Digital Image Processing

Q.1	i) Ans- c) Image Manipulation	1	OR	iii. Compare and contrast the Slant Transform and Karhunen-Loeve Transform in terms of applications and efficiency. 1 mark each point	5
	ii) Ans:- c) To focus light onto the retina	1		iv. Describe the role of DET in image analysis	5
	iii) Ans:- b) Represent images in the frequency domain	1		Q.4 i. Briefly explain fuzzy logic in intensity transformation.	3
	iv) Ans:- c) Binary Image	1		ii. Image enhancement – 1 mark Minimum 3 methods – 2 mark each	7
	v) Ans:- b) Median filter	1		OR iii. Histogram processing- 4 mark Significance in image enhancement-3 mark	7
	vi) Ans:- b) Image segmentation	1		Q.5 i. What is a chromaticity diagram- 2 mark information does it provide about colours – 2 mark	4
	vii) Ans:- b) To map color hues and saturation	1		ii. Explain the laws of color matching – 4 mark	6
	viii) Ans:- c) CMY	1		accurate color representation in digital imaging role – 2 mark	
	ix) Ans:- b) To reduce file size by estimating pixel values based on neighboring pixels	1		OR iii. Compare and contrast different color models and discuss their respective applications in color image processing.	6
	x) Ans:- c) Spatial redundancy	1		2 mark for each colour model	
Q.2	i. Explain the significance of image acquisition in the context of digital image processing	2	Q.6	Attempt any two:	
	ii. Describe the structure of the human eye and its importance in visual perception. Diagram-2M Importance-1M	3		i. Explain the differences between lossy and lossless image compression schemes with examples. 1 mark for each difference	5
	iii. Outline and describe the fundamental steps in digital image processing. Diagram-2M Steps explanation-3M	5		ii. Vector quantization in image compression-2.5 mark reduce data redundancy- 2.5 mark	5
	OR iv. Elaborate the different components of an image processing system. Diagram-2M Component-3M	5		iii. Huffman coding works as a compression method- 3 marks example of its application- 2 marks	5

Q.3	i. Define imaging geometry in the context of digital image processing.	2			
	ii. Explain the concept of separable image transforms with an example. Image transformation-2M Example-1M	3			