Register No: _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Third Semester

Applied Electronics

AP4011 - Advanced Digital Image Processing

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Can you explain the properties of Singular Value Decomposition (SVD).	UN	1	2
2.	Identify the different types of techniques used in image enhancement.	UN	1	2
3.	Explain the different applications where active contour-based segmentation is effectively used.	UN	2	2
4.	Define atlas-based segmentation and explain its purpose.	RE	2	2
5.	Describe the operators used to detect vertical, horizontal, and combined edges in an image.	UN	3	2
6.	Discuss the important advantages of the Hough transform.	UN	3	2
7.	Outline the steps in image registration applied to align images accurately.	UN	4	2
8.	Evaluate the potential advantages of image fusion and its impact on image quality and analysis.	EV	4	2
9.	Identify the purpose of slicing in a dataset.	UN	5	2
10.	Analyze the different surface types used in 3D image visualization.	AN	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Analyze the elements of visual perception, including photopic and scotopic vision, brightness adaptation and discrimination, and the Mach band effect.	AP	1	7
		ii	Elaborate the properties of the discrete cosine transform and KL transform with suitable examples.	EV	1	6
			Or			
	b	i	Provide a detailed explanation of following separable transforms i. Hadamard transform ii. DFT transform	AP	1	8
		ii	Examine the salient features relevant to morphological processing in two-dimensional images.	EV	1	5

12.	a	i	Discuss how edge detection techniques are applied to improve the accuracy of object recognition in images.	AP	2	9
		ii	Evaluate the strengths and weaknesses of model-based segmentation versus region-based and edge-based methods regarding accuracy and efficiency.	EV	2	4
			Or			
	b	i	Discuss the procedures involved in region splitting and merging approaches used in region-based segmentation?	UN	2	8
		ii	Elaborate a complete requirement for wavelet-based segmentation and include a detailed comparison of various wavelets used in the segmentation process.	UN	2	5
13.	a	i	Analyze the process of feature extraction using phase congruency techniques also discuss about its advantages.	UN	3	13
			Or			
	b	i	Create a method for classifying images with Gabor filters, including theory and practical implementation.	CR	3	5
		ii	Describe texture analysis using the gray level co-occurrence matrix and the autocorrelation function methods by providing suitable examples.	AN	3	8
14.	a	i	How the scene coherence algorithm to match and find correspondences between points in sensed and reference images.	UN	4	9
		ii	Discuss feature correspondence in brief for line matching and point pattern matching.	UN	4	4
			Or			
	b	i	Explain a comprehensive approach on the cubic spline interpolation method for resampling images.	AN	4	5
		ii	Analyze multi-resolution-based fusion using discrete wavelet transform in detail.	AN	4	8

15.	a	Explain 3D image concepts related to Face-Centered Cubic (FCC) and Hexagonal Close-Packed (HCP) lattices as well as image planes.	AP	5	13
		Or			
	b i	Explain how volumetric display is generated using ray tracing techniques.	AP	5	4
	ii	Discuss and analyze the various sources of 3D data sets in detail.	AN	5	9

*PART – C (Marks 1*15 = 15)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
16.	a	Examine the process of performing two-level (separable) wavelet decomposition on the provided image matrix.	AN	2	15

2	2	6	12	2	4	6	6
32	64	12	8	4	20	20	12
18	2	4	12	2	2	18	24
24	2	12	32	2	14	20	32
2	24	2	2	4	12	16	12
32	64	4	4	12	12	4	12
14	4	4	2	12	12	6	6
18	14	2	2	4	8	2	2

Using [1/2 1/2] as the low pass filter and [1/2,-1/2] as the high pass filter. Drop the even indexed and columns respectively during down sampling.

Or

b	i	Create an outline for image segmentation using morphological watershed techniques, highlighting the principles and applications.	CR	2	10
	ii	Describe the concept of texture feature-based segmentation in detail.	UN	2	5