Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 120004

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024

Seventh Semester

Biomedical Engineering

U19BMV42 – COMPUTER VISION

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Differentiate Low-level, High-level and Mid-level computer vision.	2	K1	CO1
2.	Compare image formation in a digital sensor and film.	2	K1	CO1
3.	How are Gabor filters used for edge detection?	2	K2	CO2
4.	What is a Histogram of Oriented Gradients (HOG) and how is it used in image processing?	2	K2	CO2
5.	Mention the key parameters to consider when constructing a 3D histogram.	2	K2	CO3
6.	List the advantages and limitations of using back projection for image reconstruction.	2	K2	CO3
7.	Indicate any four applications of photometric stereo in computer vision.	2	K2	CO4
8.	How does the choice of voxel size affect the quality and accuracy of volumetric representations?	2	K2	CO4
9.	List the key steps involved in the triangulation process.	2	K2	CO5
10.	How does bundle adjustment handle dynamic scenes with moving objects?	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Analyze the mathematical foundations of Euclidean transformations. Discuss the role of Euclidean transformations in computer vision.	13	K1	CO1

(OR)

	b)	Examine the challenges and solutions in implementing orthogonal transformations for real-time applications in robotics and autonomous vehicles.	13	K1	CO1
12.	a)	How do Harris and Hessian affine detectors achieve affine invariance? Evaluate the role of affine invariance in the context of feature detection.	13	K3	CO2
		(OR)			
	b)	Discuss the concept of scale space in computer vision. Compare and contrast the use of scale space in different feature detection algorithms.	13	K3	CO2
13.	a)	Discuss the principles of k-means clustering and its applications in image segmentation.	13	K3	CO3
		(OR)			
	b)	Analyze the different types of thresholding techniques and evaluate the role of histogram analysis in determining the optimal threshold value for image segmentation.	13	K3	CO3
14.	a)	Discuss the principles and applications of active range finding in 3D vision. Also explain the techniques for accurate depth measurement and 3D reconstruction?	13	K3	CO4
		(OR)			
	b)	Discuss the impact of surface representation techniques on the accuracy and efficiency of 3D reconstruction algorithms. Provide examples with suitable illustrations.	13	K3	CO4
15.	a)	Elucidate in detail about the practical applications of spline-based motion detection in medical imaging and surgical planning.	13	K3	CO5
		(OR)			
	b)	Discuss the technological advancements that have facilitated translational alignment. Also explain the current trends and future directions in this field.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	For implementing a computer vision system for an autonomous passenger car for urban usage, you are asked to develop a 3D object recognition technique. Discuss the challenges, solutions, and the impact that can create on the overall performance of autonomous vehicles. Also provide justification for your statements.	15	K4	CO4
		(OR)			
	b)	Indicate different methods for 3D vision. Explain the technique by which each 3D vision system handles moving objects and changing environments.	15	K4	CO4