U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

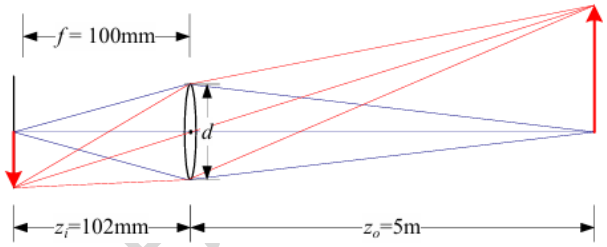
Programme: B.E. **Semester: VII**

Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**

Course Code: 22EI7PE3CV **Max Marks: 100**

Course: Computer Vision

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			MODULE- I	CO	PO	Marks
	1	a)	What is computer vision? Discuss any two applications of computer vision.	CO1	PO1	**06**
		b)	 Fig 2.b Figure 2.b indicates a lens optics used in a camera, to form a 3D point into a 3D image . Explain how the pixel formation takes place using this camera model	CO1	PO1	**06**
		c)	Discuss about the Geometric 3D primitives that can be used to describe 3D shapes.	CO1	PO1	**08**
			OR			
	2	a)	Illustrate with an example how a linear filter, in which an output pixel's value is determined as a weighted sum of input pixel values uses 2D convolution.	CO1	PO1	**06**
		b)	Show that the Laplacian of Gaussian ?(LoG) operation can be achieved by decomposing the operator into four one dimensional convolution. Also discuss about the LoG operator	CO1	PO2	**06**
		c)	How will scaling, symmetry and separability of Gaussian operator help in image processing? Explain	CO1	PO1	**08**

			MODULE - II			
	3	a)	Canny's Edge detector is one of the popular techniques to identify the boundary of an object in an image. Justify the statement by discussing the edge detection algorithm in detail.	*CO2*	*PO1*	**07**
		b)	Why do we consider corners as important key points in images? How are they considered as vision features? Discuss with Harris Corner detection techniques?	*CO2*	*PO2*	**06**
		c)	Discuss the algorithm steps of Hough procedure to detect lines in images.	*CO2*	*PO2*	**07**
			OR			
	4	a)	What do you mean by interpolation and decimation in images?How are they applied in Laplacian image pyramids? Discuss	*CO2*	*PO2*	**10**
		b)	Illustrate the working of Scale Invariant Feature Transform for computing Gradient orientation and magnitudes, there by generation of histogram as features.	*CO2*	*PO2*	**10**
			MODULE- III			
	5	a)	Define image segmentation rules? How segmentation is different from Edge based approach in object identification? Discuss.	*CO2*	*PO2*	**07**
		b)	How is watershed computation in segmentation can help partitioning the image into different regions? Discuss	*CO2*	*PO2*	**05**
		c)	Compare and contrast split-merge technique with graph cutd segmentation technique for object detection.	*CO2*	*PO2*	**08**
			OR			
	6	a)	Given a binary image of a connected object, where the pixels forming the boundary of the object have the following coordinates in a 2D grid:(2,3), (2,4), (3,4), (4,4), (4,3), (4,2), (3,2), (2,2) , calculate the area enclosed by the object.	*CO2*	*PO2*	**07**
		b)	What is object labeling in image processing, and how does it aid in identifying distinct objects in a binary image? explain	*CO2*	*PO2*	**07**
		c)	Explain the process of boundary tracking in image segmentation. How does it help in extracting the contour of an object?	*CO2*	*PO2*	**06**
			MODULE - IV			
	7	a)	What are the assumptions made while applying background subtraction method for motion detection? discus	*CO3*	*PO2*	**05**
		b)	How is motion Jacobians being different from the basic frame differencing? Discus.	*CO3*	*PO2*	**07**

		c)	Discus with necessary equations used in detection of optical flow using Lucas Kanade algorithm	*CO3*	*PO2*	**08**
			OR			
	8	a)	How will Multi-frame motion estimation be carried out using spatio-temporal analysis? Explain	*CO3*	*PO2*	**08**
		b)	Discus windowed Sum of squared difference (SSD) algorithm to estimate the motion.	*CO2*	*PO2*	**07**
		c)	List the major steps of motion detection in frame differencing method and explain the algorithm.	*CO3*	*PO2*	**05**
			MODULE- V			
	9	a)	Explain the concept of Content-Based Image Retrieval (CBIR) and its primary components. How does it differ from traditional keyword-based image retrieval methods?	*CO4*	*PO2*	**10**
		b)	What is Content-Based Video Retrieval (CBVR), and how does it extend the principles of CBIR to video data? elaborate	*CO4*	*PO2*	**10**
			OR			
	10	a)	Define activity recognition in computer vision. Discuss how machine learning models can be used to classify and recognize human activities in videos.	*CO4*	*PO2*	**10**
		b)	Explain the concept of computational photography and how it differs from traditional photography? Explain technique High Dynamic Range (HDR) imaging used in computational photography.	*CO4*	*PO2*	**10**

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