CBCS SCHEME - Make-Up Exam

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BCS613B

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Computer Vision

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define computer vision. Explain how computer vision mimics human perception. Why is it considered challenging in AI?	6	L2	CO1
	b.	Summarize the evolution of computer vision from 1970 to 2020 with focus on key milestones.	8	L2	CO1
	c.	How are computer vision applications utilized in healthcare and autonomous systems?	6	L2	CO1
		OR			
Q.2	a.	Explain the concept of reflectance and shading in the context of image formation. List different models used discuss how they influence surface appearance with reference to BRDF Bidirectional reflectance distribution Funch and Phong shading.	10	L2	CO1
	b.	Differentiate between convolution and correlation in linear filtering. Explain the convolution operation using impulse response function.	10	L2	CO1
		Module – 2			
Q.3	a.	Define the Discrete Fourier Transform (DFT). How does it differ from the continuous Fourier transform?	6	L2	CO2
	b.	What is the difference between linear and non-linear filtering? Also explain the concept of median filtering in the context of non-linear filtering techniques.	6	L2	CO2
	c.	Describe how 2D wavelet decomposition is performed, including the roles of LH, HL and HH components. Illustrate the answer with an explanation of the separable filtering process.	8	L3	CO2
		OR			
Q.4	a.	List and explain different types of 2D parametric transformations used in computer vision. Differentiate between forward warping and inverse warping in image transformation.	10	L2	CO2
	b.	Explain the roles of interpolation and decision in constructing multi resolution representations using pyramids and wavelets. How do these operations differ between Gaussian/Laplacian pyramids and wavelet transforms?	10	L2	CO2

		Module – 3			
Q.5	a.	Explain the concept of linear filtering in image processing. Apply a linear filter to 3 × 3 grayscale image using convolution.	10	L3	CO3
	b.	Illustrate the understanding of segmentation by describing how point, line and edge detection techniques are employed to identify local intensity changes in images.	10	L3	CO3
		OR			
Q.6	a.	Apply harmonic and contra-harmonic filter under spatial domain filtering techniques to enhance a degraded 3 × 3 image. Also explain how the filters help in noise reduction.	10	L3	CO3
	b.	Explain the principles and steps involved in image segmentation using i) Region growing ii) Region splitting and merging Explain with suitable example.	10	L2	CO3
		Module – 4			
Q.7	a.	Describe the key differences between chromatic and achromatic light. Discuss the relevance of this distinction in color image processing.	10	L2	CO4
	b.	Explain the process of converting an image from RGB to HSI color space and vice versa. Discuss the advantages of using HSI color space in image analysis.	10	L2	CO4
		OR			
Q.8	a.	Describe the techniques used smoothening and sharpening color images. Support your explanation with appropriate mathematical equations and discuss the impact of these techniques on image quality.	10	L2	CO4
	b.	What is pseudocolor image processing and explain the same.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain morphological operations: i) erosion and dilation	10	L2	CO5
	b.	List and explain any three basic morphological algorithms. Include their purpose and basic working principle.	10	L2	CO5
		OR			
Q.10	a.	Describe the concept of chain codes in boundary representation. How are they generated, what are their advantages and limitations?	10	L2	CO5
	b.	Define and explain the concept of pattern vectors and structural patterns in the context of pattern recognition.	10	L2	CO5

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