QPC: 23RAPhD009 AY 23 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

Ph.D. (Second Semester) Examinations, April – 2024

PPECS2013 – Computer Vision

(CSE)

Time: 3 hrs Maximum: 70 Marks

The figures in the right-hand margin indicate marks.

Answer ANY FIVE Questions **(14 x 5 = 70 Marks)**

		Marks
1.a.	Discuss the concept of image restoration. How does it differ from image enhancement, and what are the common restoration algorithms?	7
b.	Explain the significance of histogram processing in digital image processing. How can histogram equalization improve the contrast of an image?	7
2.a.	How do the characteristics of the imaging system (e.g., sensor properties, optics) influence image formation and subsequent processing?	7
b.	Illustrate the application of low-pass, high-pass, and band-pass filters in digital image processing. How do they affect the spatial frequency content of an image?	7
3.a.	Discuss challenges and limitations associated with depth estimation from multi-camera views, including occlusions, calibration errors, and computational complexity?	7
b.	What are some recent advancements or research trends in depth estimation and multi-camera systems? How do these developments address existing limitations and open up new possibilities for applications?	7
4.a.	Explain the concept of Histogram of Oriented Gradients (HOG) in feature extraction. How is it used in object detection and recognition tasks?	7
b.	Describe the Discrete Wavelet Transform (DWT) and its role in feature extraction. How does it capture both spatial and frequency information in images?	7
5.a.	Explain the mean-shift algorithm for image segmentation. How does it perform clustering based on the density distribution of pixels in feature space? What are its applications and limitations?	7
b.	What are Markov Random Fields (MRFs), and how are they utilized in image segmentation? Discuss their role in capturing spatial dependencies and contextual information for more accurate segmentation results.	7
6.a.	Discuss the K-Nearest Neighbors (KNN) algorithm for classification. How does it classify data points based on their proximity to neighboring points in the feature space? What are its strengths and weaknesses?	7

b.	Explain the basics of Artificial Neural Networks (ANNs) as classifiers. How do neural network models learn to map input features to output classes, and what are some common architectures used in pattern classification tasks?	7
7.a.	Describe dimensionality reduction techniques such as Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), and Independent Component Analysis (ICA). What are their objectives, and how do they help in reducing the complexity of high-dimensional data?	7
b.	Discuss the concept of non-parametric methods in pattern analysis. What distinguishes them from parametric methods, and what are some examples of non-parametric approaches commonly used in classification and clustering tasks?	7
8.a.	Discuss the challenges associated with motion analysis in real-world environments, including varying lighting conditions, complex backgrounds, and occlusions. How do researchers and practitioners address these challenges in motion analysis systems?	7
b.	What are some practical applications of motion analysis techniques in fields such as surveillance, human-computer interaction, and autonomous navigation? Provide examples of how motion analysis enhances the functionality and performance of these systems?	7

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