

**BTCS3153**

B.Tech.(CSBS-TCS)

VI Semester Examination, June 2024

**Image Processing and Pattern Recognition**

Choice Based Credit System (CBCS)

**Time: 3 Hrs.****Maximum Marks: 60****Minimum Pass Marks: 24**

Note: (1) All questions carry equal marks, out of which part 'A' and 'B' carry 3 marks and part 'C' carries 6 marks.  
 (2) From each question, part 'A' and 'B' are compulsory and part 'C' has internal choice.  
 (3) Draw neat diagram, wherever necessary.  
 (4) Assume suitable data wherever necessary.

**Q.1(A)** What are the primary applications of image processing systems, and how do they contribute to various industries such as healthcare, robotics, and security? **03**

**(B)** Could you describe some basic image file formats commonly used in image processing, and what are their characteristics and advantages? **03**

**(C)** How do geometric and photometric models influence the representation and manipulation of images in image processing systems? Can you provide examples of how these models are applied in real-world scenarios? **06**

**OR**

What is digitization in the context of image processing, and what are the processes of sampling and quantization? How do these processes affect the quality and fidelity of digital images?

**Q.2(A)** What is contrast stretching in image enhancement, and how does it contribute to improving the visual quality of images? Can you explain the concept and process involved in contrast stretching? **03**

**(B)** What is histogram specification, and how is it utilized in image enhancement techniques? Can you describe the steps involved in histogram specification and its effects on image appearance? **03**

**(C)** How does local contrast enhancement differ from global contrast enhancement techniques? What are the advantages of local contrast enhancement, and in what scenarios is it particularly useful? **06**

**OR**

What are the key principles behind image smoothing techniques, and how do linear and order statistic filtering methods contribute to reducing noise and improving image quality?

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**Q.3(A)** What is pixel classification in image processing, and how does it contribute to image analysis? Can you explain the concept of grey-level thresholding and its significance in pixel classification? 03

**(B)** What are the differences between global and local thresholding methods in image segmentation? Can you provide examples of scenarios where each method is more suitable? 03

**(C)** How does optimum thresholding, based on Bayes analysis or the Otsu method, determine the optimal threshold for image segmentation? What are the advantages of using these methods compared to simple thresholding techniques? 06

**OR**

What are the techniques involved in region growing and split/merge methods for image segmentation? How is line detection achieved, and what is the role of the Hough transform in detecting lines within images?

**Q.4(A)** What are textural features in image analysis, and how is the gray level co-occurrence matrix utilized to extract them? 03

**(B)** How are moments calculated in image processing, and what role do they play in describing the spatial distribution of pixel intensities? 03

**(C)** Can you describe the process of connected component analysis in image processing? How does it contribute to identifying and analyzing distinct objects or regions within an image? 06

**OR**

What is the convex hull of an object in image processing, and how is it calculated? How does the convex hull aid in representing the shape and structure of objects within images?

**Q.5(A)** Can you explain the fundamentals of different color models such as RGB, CMY, HSI, YCbCr, and Lab? 03

**(B)** What are false color and pseudo-color representations in image processing? How are they used to enhance visual interpretation or highlight specific features in images? 03

**(C)** How does color enhancement contribute to improving the visual quality of images? Can you describe common techniques used for color enhancement in image processing? 06

**OR**

What is image segmentation, and why is it an essential task in image analysis? How are dilation and erosion operators utilized in segmentation processes, and what roles do they play?

**Xxxxxxx**