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**Question Paper Code: 99806**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Elective

Information technology

19UIT906- Fundamentals of Image Processing

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

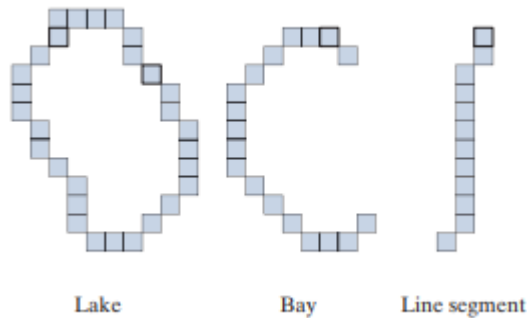
PART – A (5 x 20= 100Marks)

1. (a) What are the elements of image processing system? And Explain any four basic relationships between pixels CO1-U (20)  
Or  
(b) You are given a computer chip that is capable of performing linear filtering in real time, but you are not told whether the chip performs correlation or convolution. Give the details of a test you would perform to determine which of the two operations the chip performs CO3-Ana (20)
2. (a) What are the derivative operators useful in image segmentation? Explain their role in segmentation CO1-U (20)  
Or  
(b) What is meant by the Gradient and the Laplacian? Discuss their role in image enhancement CO1-U (20)
3. (a) Compare the Lossless Compression and Lossy Compression with Real time Applications CO3-Ana (20)  
Or  
(b) Compare Contour extraction and representation with the Homogenous region extraction and representation CO3-Ana (20)

4. (a) Consider a binary image of size  $200 \times 200$  pixels, with a vertical black band extending from columns 1 to 99 and a vertical white band extending from columns 100 to 200. CO2-App (20)
- (a) Obtain the co-occurrence matrix of this image using the position operator “one pixel to the right.”
- (b) Normalize this matrix so that its elements become probability estimates
- (c) Use your matrix from (b) to compute the six descriptors

Or

- (b) Describe in detail about the PCA CO1-U (20)
5. (a) Three curve types (lake, bay, and line segment) useful for differentiating thinned objects in an image are shown in the following figure. Develop a morphological/logical algorithm for differentiating between these shapes. The input to your algorithm would be one of these three curves. The output must be the type of the input. You may assume that the curves are 1 pixel thick and are fully connected. They can appear in any orientation CO2- App (20)



Or

- (b) Compare the characteristics of Low pass, High pass and Homomorphic filters in image enhancement in frequency domain for a real time application CO3- Ana (20)