JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech-6th Semester (ECE)

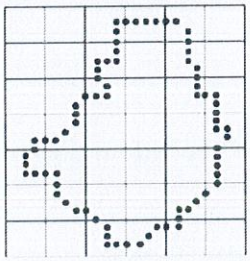
COURSE CODE (CREDITS):19B1WEC633(3) MAX. MARKS: 35

COURSE NAME: Computer Vision

COURSE INSTRUCTORS: Lt. Praggya Gupta MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

<table>
<tr><th>Q.No</th><th>Question</th><th>CO</th><th>Marks</th></tr>
<tr><td>Q1</td><td>Consider the given shape and determine the 4- and 8-directional chain code, first difference, and shape number.
  </td><td>CO-3</td><td>3+2+2</td></tr>
<tr><td>Q2</td><td>Discuss the concept of regional descriptors in Computer Vision. Explain their significance in object recognition and image analysis. Compare regional descriptors with boundary descriptors, and describe at least four commonly used regional descriptors with their applications.</td><td>CO-3</td><td>7</td></tr>
<tr><td>Q3</td><td>An image has 4 gray levels: 0, 1, 2, and 3. The normalized histogram of the pixel intensities is given below:
<table><tr><td>Gray Level (i)</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>P(i)</td><td>0.1</td><td>0.2</td><td>0.4</td><td>0.3</td></tr></table>Using Otsu's between-class variance method, determine the optimal threshold to separate the image into background and foreground classes.</td><td>CO-2</td><td>6</td></tr>
<tr><td>Q4</td><td>(a)Define the signature of the boundary. What is the signature of circular and square boundaries? How can we make the signature of the boundary rotation invariant, shift invariant, and scale invariant?
(c) Discuss different types of boundary descriptors</td><td>CO-4</td><td>4+3</td></tr>
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Q5	Given the following 5×5 grayscale image with intensity values 0, 1, and 2: 0 0 1 1 2 0 1 1 2 2 1 1 2 2 0 1 2 2 0 0 2 2 0 0 1 (a) Construct the Gray-Level Co-occurrence Matrix (GLCM) for the position vector one pixel to the right. (b)Using the GLCM, first define and then compute the following texture descriptors: 1. Contrast 2. Entropy 3. Homogeneity **Note: Normalize the GLCM if needed, and assume gray levels are in the range [0, 2].**	CO-4	8