

19/2 1:30 PM

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATION- 2025

B.Tech-6th Semester (ECE)

COURSE CODE (CREDITS):19B1WEC633 (3)

MAX. MARKS: 15

COURSE NAME: Computer Vision

COURSE INSTRUCTORS: Lt. Praggya Gupta

MAX. TIME: 1 Hour

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

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

Q.No	Question	CO	Marks																																				
Q1	Explain any three real-world applications of computer vision in modern technology.	CO 4	1.5																																				
Q2	<p>a) What are the main steps involved in the Canny edge detection algorithm?</p> <p>b) In the context of edge detection, what is the purpose of the "non-maximum suppression" step?</p> <p>c) The gradient magnitude at a point in an image is calculated as:</p> $G = \sqrt{G_x^2 + G_y^2}$ <p>Where <math>G_x = 30</math>, and <math>G_y = 40</math></p> <p>Find the gradient magnitude <math>G</math> and determine if this edge is strong or weak if the threshold values are:</p> <ul style="list-style-type: none"><li>• Low Threshold = 20</li><li>• High Threshold = 50</li></ul>	CO 1	1+1.5+1																																				
Q3	<p>a) Briefly explain how the region-growing algorithm identifies regions and how the selection of a seed point affects the process.</p> <p>b) Divide the given image into two regions using the region growing algorithm if the threshold condition is <math>\text{mod}(\text{pixel-seed}) &lt; \text{threshold}</math>. Choose seed pixel accordingly</p> <table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>1</td><td>1</td><td>1</td><td>2</td><td>8</td><td>7</td></tr><tr><td>2</td><td>0</td><td>1</td><td>2</td><td>8</td><td>8</td></tr><tr><td>3</td><td>0</td><td>7</td><td>7</td><td>9</td><td>8</td></tr><tr><td>4</td><td>0</td><td>8</td><td>8</td><td>8</td><td>9</td></tr><tr><td>5</td><td>1</td><td>2</td><td>8</td><td>8</td><td>9</td></tr></table>		1	2	3	4	5	1	1	1	2	8	7	2	0	1	2	8	8	3	0	7	7	9	8	4	0	8	8	8	9	5	1	2	8	8	9	CO 1	2+3
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Q4	<p>a) Differentiate between global and adaptive thresholding.</p> <p>b) Consider the following <math>5 \times 5</math> grayscale image with pixel intensities:</p> $\begin{bmatrix} 10 & 50 & 80 & 100 & 200 \\ 20 & 60 & 90 & 110 & 210 \\ 30 & 70 & 100 & 120 & 220 \\ 40 & 80 & 110 & 130 & 230 \\ 50 & 90 & 120 & 140 & 240 \end{bmatrix}$ <p>Calculate the mean intensity of the image and use it as the global threshold <math>T</math>. Using the threshold <math>T</math>, classify each pixel as belonging to the <b>object</b> (if its intensity is <math>\geq T</math>) or the <b>background</b> (if its intensity is <math>&lt; T</math>). Represent the result as a binary image where <b>1</b> represents the object and <b>0</b> represents the background.</p>	CO 1	2+3
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