

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: D1 + TD1

Programme Name & Branch : B.Tech & Computer Science and Engineering
 Course Code and Course Name : BCSE407L and Computer Vision
 Faculty Name(s) : Prof. G. N. Balaji & Prof. ANINDITA KUNDU
 Class Number(s) : VL2025260103348, 3352
 Date of Examination : 20.08.2025
 Exam Duration : 90 minutes

Maximum Marks: 50

Answer All Questions

- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- CO1: Analyze image formation using digital camera and its principles
- CO2: Evaluate feature extraction and feature estimation for image or video

Q. No	Question	M	CO	BL
1.	Discuss the relationship between the physical properties of a camera, image formation, and the resulting image quality. What are the critical factors to consider when capturing an image for further processing?	10	1	2
2.	Identify the type of noise in the following image f and explain the different types of filters (any 4) to remove the noise with necessary equations. Apply padding if necessary to process the image. $f(x,y) = \begin{bmatrix} 50 & 52 & 55 & 255 & 60 \\ 0 & 55 & 58 & 60 & 62 \\ 55 & 58 & 0 & 62 & 65 \\ 58 & 60 & 62 & 65 & 68 \\ 60 & 62 & 65 & 68 & 70 \end{bmatrix}$	10	1	4
3.	Consider the following 5×5 grayscale image I: $I(x,y) = \begin{bmatrix} 10 & 10 & 20 & 20 & 20 \\ 10 & 10 & 20 & 20 & 20 \\ 20 & 20 & 30 & 30 & 30 \\ 20 & 20 & 30 & 40 & 40 \\ 20 & 20 & 30 & 40 & 50 \end{bmatrix}$ i) Using the Prewitt operator, compute the horizontal (G_x) and vertical (G_y) gradients at the central pixel (value 30 in row 3, column 3). (4 Marks) ii) Use the following Kirsch compass masks, determine the maximum gradient magnitude at the same pixel and the direction of the edge. (6 Marks) $M_6 \text{ (South)} = \begin{bmatrix} -3 & -3 & -3 \\ -3 & 0 & -3 \\ 5 & 5 & 5 \end{bmatrix}, \quad M_7 \text{ (SE)} = \begin{bmatrix} -3 & -3 & -3 \\ -3 & 0 & 5 \\ -3 & 5 & 5 \end{bmatrix}$	10	2	4



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4.	Segment the given image fusing region growing algorithm. Use the points marked in the image as seed points and assume the threshold value as 1. $f(x,y) =$ <table><tr><td></td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>0</td><td>5</td><td>6</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>6</td><td>7</td><td>7</td><td>1</td><td>1</td><td>1</td><td>6</td></tr><tr><td>2</td><td>3</td><td>6</td><td>7</td><td>7</td><td>7</td><td>6</td><td>5</td></tr><tr><td>3</td><td>4</td><td>3</td><td>7</td><td>7</td><td>7</td><td>5</td><td>3</td></tr><tr><td>4</td><td>3</td><td>3</td><td>2</td><td>1</td><td>3</td><td>3</td><td>4</td></tr><tr><td>5</td><td>2</td><td>2</td><td>1</td><td>2</td><td>1</td><td>2</td><td>3</td></tr><tr><td>6</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>2</td></tr></table>		0	1	2	3	4	5	6	0	5	6	1	1	1	0	0	1	6	7	7	1	1	1	6	2	3	6	7	7	7	6	5	3	4	3	7	7	7	5	3	4	3	3	2	1	3	3	4	5	2	2	1	2	1	2	3	6	1	1	1	1	1	2	2	10	2	6
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5.	You are given a partially annotated medical image where the tumor region has been roughly marked by a clinician. Explain how Graph Cut segmentation can refine this annotation. Include in your answer how the energy function is formulated, how user input is incorporated, and how you would validate the segmentation.	10	2	1																																																																
