



VIT

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

REG.NO.:

0962

SLOT: F1+TF1

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

309

30

Programme Name & Branch : B.Tech. Computer Science and Engineering
Course Code and Course Name : BCSE403L Digital Image Processing
Faculty Name(s) : Dr. Natarajan, Dr. Anisha M Lal
Class Number(s) : VL2025260502423, 2053
Date of Examination : 1-2-2026
Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- 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)
- Course Outcomes
 1. Ascertain and describe the basics of Image processing concepts through mathematical interpretation.
 2. Acquire the knowledge of various image transforms and image enhancement techniques involved.

Q. No	Question	Module	Marks	CO
1.	An Image segment is shown below. Let V be the set of gray level values used to define connectivity in the image compute D₄, D₈ and D_m distance between pixels 'p' and 'q' for (i) V = {2, 3, 6} (ii) V = {2, 3, 5} <pre> 2 (p) 3 2 6 1 6 2 3 6 2 5 3 2 3 5 2 3 5 4 3 2 4 3 5 2 4 5 2 3 6 (q) </pre>	1	10	1
2.	a. Discuss, how does a scanner or camera transform a real-world picture into a grid of pixels that can be processed digitally. (4 marks) b. Compute the file size in kB of a BMP image with 10 bits per color channel for an RGB image of size 400 x 300. (3 marks) c. Design a high boost filter in spatial domain using variant of isotropic filter with amplifying factor 2. (3 marks)	1	10	
3.	Perform gray level slicing on the following image segment with r₁ = 5 and r₂ = 11. (i) With background (ii) without background	2	10	



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3	7	9	12	14	15
5	8	11	13	14	15
4	3	4	10	12	14
3	0	2	5	9	13
1	3	5	7	9	11
2	4	6	8	10	12

After performing the slicing, find the difference between the with background and without background.

4. A CT scan image segment of a human lung appears blurred due to motion during scanning. As a medical image analyst, you are tasked with enhancing the image, so that the edges can be clearly detected for diagnostic purposes. Propose and justify a suitable 8-neighbourhood filter to reduce the blur effect. Apply the chosen filter using a 3×3 mask with pixel replication and demonstrate the computation to obtain the filtered image.

125	100	99
110	52	66
90	63	48

5. Compute the two-dimensional Discrete Fourier Transform for the grayscale image given below.

$$f(m, n) = \begin{matrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 2 \\ 2 & 1 & 2 & 1 \\ 1 & 2 & 2 & 1 \end{matrix}$$
