

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2025

B. Tech Program: AIDS Scheme I/II/IIB/III: III

Regular Examination: TY Semester: V

Course Code: AIDLC5042 and Course Name: Image and Video Processing

Date of Exam: 28/11/2025

Duration: 02.5 Hours

Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level															
Q 1	Solve any two questions out of three: (05 marks each)	10																	
a)	Perform histogram equalization on the following image: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>2</td><td>5</td><td>4</td><td>5</td><td>2</td></tr> <tr><td>2</td><td>5</td><td>6</td><td>5</td><td>2</td></tr> <tr><td>5</td><td>1</td><td>1</td><td>2</td><td>1</td></tr> </table>	2	5	4	5	2	2	5	6	5	2	5	1	1	2	1		CO2	AP
2	5	4	5	2															
2	5	6	5	2															
5	1	1	2	1															
b)	Illustrate the process of point processing using examples of contrast stretching and intensity-level slicing.		CO3	AP															
c)	A noisy image contains salt noise (0-value pixels). Given the neighborhood <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>50</td><td>48</td><td>52</td></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>55</td><td>60</td><td>58</td></tr> </table> Apply a median filter to compute the enhanced center pixel and explain how median filtering preserves edges compared to averaging.	50	48	52	0	0	0	55	60	58		CO2	AP						
50	48	52																	
0	0	0																	
55	60	58																	
Q 2	Solve any two questions out of three: (05 marks each)	10																	
a)	Explain morphological dilation and erosion. Explain both operations using 5×5 binary image of your choice.		CO3	U															
b)	Describe edge detection using the Laplacian of Gaussian (LoG). Why is zero-crossing important?		CO3	U															
c)	Discuss the effect of gamma correction on image brightness. Provide a suitable example.		CO2	U															
Q.3	Solve any two questions out of three. (10 marks each)	20																	

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a)	<p>i) Perform Discrete Cosine Transform (DCT) on the 4×4 image block of your choice.</p> <p>ii) Discuss the energy compaction property of DCT.</p>	20	CO4	AP									
b)	<p>i) Describe the step-by-step procedure for computing the Hadamard Transform of a 1-D signal. Illustrate your answer with a simple numerical example.</p> <p>ii) Write a short note on the applications of the Hadamard Transform in digital image processing. Mention at least three key use cases.</p>		CO4	AP									
c)	<p>i) What is High-Boost Filtering? Explain how it differs from standard image sharpening techniques such as Laplacian filtering.</p> <p>ii) Discuss the applications of High-Boost Filtering in digital image processing. How does the technique help in enhancing details in low-contrast images?</p>		CO2	AP									
Q.4	Solve any two questions out of three. (10 marks each)												
a)	<p>i) Explain the basic steps involved in video processing. Describe how video acquisition, sampling, and quantization contribute to preparing a video signal for further processing.</p> <p>ii) Discuss the importance of motion estimation and motion compensation in video processing. Explain how these steps improve video compression and overall processing efficiency.</p>		CO5	AP									
b)	<p>i) Describe any two AI-based denoising techniques.</p> <p>ii) Evaluate the benefits of super-resolution networks in medical imaging.</p>		CO6	AP									
c)	<p>i) Explain the Graph-Theoretic Technique for Edge Linking.</p> <p>ii) For the following 3×3 gradient magnitude values, construct the corresponding graph and demonstrate how edges are linked using threshold-based neighborhood connectivity.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>5</td><td>8</td><td>7</td></tr> <tr> <td>6</td><td>12</td><td>11</td></tr> <tr> <td>4</td><td>9</td><td>10</td></tr> </table>	5	8	7	6	12	11	4	9	10		CO3	AP
5	8	7											
6	12	11											
4	9	10											

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