

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

<p style="text-align: center;">JAN – FEB 2026 PhD Program: Academic Year 2025-26 Course Work Examination Course Code: PhD102 and Course Name: Digital Image Processing Date: 21-01-2026 Duration: 2.00 PM to 4.30 PM Max. Marks: 70</p>																													
Instructions: (1) All questions are compulsory. (2) Draw neat diagrams wherever applicable. (3) Assume suitable data, if necessary. (Add/remove the instructions)																													
	Question	Max. Marks	CO	BT Level																									
Qu-1	Solve any THREE questions out of FOUR .	15																											
i)	Explain any two Spatial Domain Filtering methods.	5	CO1	U																									
ii)	Explain smoothing filters and Sharpening Filters gradient.	5	CO2	U																									
iii)	Explain any two Fourier transform properties.	5	CO3	U																									
iv)	Explain Noise Restoration Filters.	5	CO4	U																									
Qu-2	Solve any THREE questions out of FOUR .	15																											
i)	Apply RLE method on given binary image. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	CO5	Apply
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1	1	1	1	1																									
ii)	Differentiate between Discrete Wavelet Transform (DWT) and Continuous Wavelet.	5	CO6	U																									
iii)	Explain the basic principles of morphological image processing and role of a structuring element.	5	CO7	U																									
iv)	Explain any two edge detection operators in detail.	5	CO8	U																									
Qu-3	Solve any TWO questions out of THREE .	20																											
i)	Apply the 2D-DFT on the given gray scale image and find inverse transform [1 1 1 1, 1 1 1 1, 1 1 1 1, 1 1 1 1]	10	CO3	Apply																									
ii)	Apply histogram equalization method on given image [4 4 4 4 4, 3 4 5 4 3, 3 5 5 5 3, 3 4 5 4 3, 4 4 4 4 4]	10	CO2	Apply																									

iii)	State and prove Shannon's First Theorem. Construct the Shannon Fano code for following set of symbol as shown below. Symbols: A B C D E F G Probability: 0.3, 0.2, 0.2, 0.1, 0.1, 0.05, 0.05	10	CO5	Apply
Qu-4	Solve any TWO questions out of THREE .	20		
i)	Explain Digital image watermarking in detail.	10	CO6	U
ii)	Apply Opening and Closing morphological algorithms on given image: X= [000000, 000110, 001110, 011110, 011100, 000000] and structuring matrix B=[0 1 0, 1 1 1, 0 1 0].	10	CO7	Apply
iii)	Explain different thresholding techniques: simple thresholding, iterative thresholding and OTSU method.	10	CO8	U
