

**JAN – FEB 2026**

PhD Program: Academic Year 2025-26

Course Work Examination

Course Code: **PhD102** and Course Name: **Digital Image Processing**

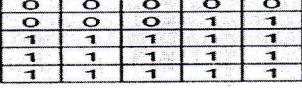
Date: 21-01-2026

Duration: 2.00 PM to 4.30 PM

Max. Marks: 70

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 <b>THREE</b> questions out of <b>FOUR</b> .	<b>15</b>		
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 <b>THREE</b> questions out of <b>FOUR</b> .	<b>15</b>		
i)	Apply RLE method on given binary image. 	5	CO5	Apply
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 <b>TWO</b> questions out of <b>THREE</b> .	<b>20</b>		
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 <b>TWO</b> questions out of <b>THREE</b> .	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

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