

## **Sardar Patel Institute of Technology** Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	Т	P	L	Т	Р	Total
EXC7051	Digital Image Processing	4			4			4
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% Weightage)			tage)

Pre-requisite	Course	e Codes	EXS 401 : Applied Mathematics IV		
			EXC 504 : Signal and Systems		
After successf	ful com	pletion of	the course, student will be able to		
	CO1	Discuss	the fundamental concepts of digital image processing		
Course Outcomes	CO2	Discuss	Discuss image enhancement and segmentation techniques		
	CO3	Apply s	aitable operators for binary image processing		
	CO4	Apply s	aitable transform techniques on digital image		
	CO5	Discuss	digital image compression and decompression techniques		

Module No.	Unit No.	Topics		Hrs.		
1	1100	Digital Image Processing Fundamentals		06		
	1.1	Introduction: Background, Digital Image Representation,	1,2,3			
		Fundamental Steps in Image Processing, Elements of a Digital Image				
		Processing System				
	1.2	<b>Digital Image Fundamentals:</b> Elements of Visual Perception, A				
		Simple Image Model, Sampling and Quantization, Some Basic				
		Formats BMP TIFE and IPEG Colour Models				
		(RGB, HSL YUV)				
2		Image Enhancement		08		
	2.1	Spatial Domain Methods, Frequency Domain Methods, Some Simple	1.2.3			
	-	Intensity Transformations, Histogram Processing, Image Subtraction,	, ,			
		Image Averaging, Background				
	2.2	Smoothing Filters, Sharpening Filters, Lowpass Filtering, Highpass	1,2,3			
		Filtering, Generation of Spatial Masks from Frequency Domain				
		Specifications. Homomorphic Filtering.		0.0		
3		Image Segmentation and Representation	1.0.0	08		
	3.1	Detection of Discontinuities, Edge Linking using Hough Transform,	1,2,3			
	2.2	Inresholding, Region based Segmentation, Split and Merge Technique	100			
	3.2	Image Representation and Description, Chain Code, Polygonal,	1,2,3			
		Representation, Snape Number, Moments.		06		
4	4 1	Dinary Mambalagical Operators	100	VO		
	4.1	Binary Morphological Operators, Hit-or-Miss Iransformation,	1,2,3			
		boundary Extraction, Region Fining, running and ruckening,				



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		Connected Component Labeling, Iterative Algorithm and Classical		
		Algorithm		
5		Image Transform		12
	5.1	Introduction to the Fourier Transform, The Discrete Fourier	1,2,3	
		Transform, Some Properties of the Two-Dimensional Fourier		
		Transform Fast Fourier Transform(FFT),		
	5.2	Discrete Hadamard Transform(DHT), Fast Hadamard	1,2,3	
		Transform(FHT), Discrete Cosine Transform(DCT), Discrete Wavelet		
		Transform(DWT),		
(				4.4
0		Image Compression:		12
0	6.1	Fundamentals – Coding Redundancy, Interpixel Redundancy,	1,2,3	12
0	6.1	Image Compression:Fundamentals – Coding Redundancy, Interpixel Redundancy,Psychovisual Redundancy, Fidelity Criteria.	1,2,3	12
0	6.1 6.2	Image Compression:Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria.Image Compression Models – The Source Encoder and Decoder,	1,2,3	12
0	6.1 6.2	Image Compression:Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria.Image Compression Models – The Source Encoder and Decoder, Lossless Compression Techniques : Run Length Coding, Arithmetic	1,2,3 1,2,3	12
0	6.1 6.2	Image Compression:Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria.Image Compression Models – The Source Encoder and Decoder, Lossless Compression Techniques : Run Length Coding, Arithmetic Coding, Huffman Coding, Differential PCM,	1,2,3 1,2,3	12
0	6.1 6.2 6.3	Image Compression:Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria.Image Compression Models – The Source Encoder and Decoder, Lossless Compression Techniques : Run Length Coding, Arithmetic Coding, Huffman Coding, Differential PCM, Lossy Compression Techniques: Improved Gray Scale Quantization,	1,2,3 1,2,3 1,2,3	12
0	6.1 6.2 6.3	Image Compression:Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria.Image Compression Models – The Source Encoder and Decoder, Lossless Compression Techniques : Run Length Coding, Arithmetic Coding, Huffman Coding, Differential PCM, Lossy Compression Techniques: Improved Gray Scale Quantization, Vector Quantization, JPEG, MPEG-1.	1,2,3 1,2,3 1,2,3	12

## **References:**

[1] Rafel C. Gonzalez and Richard E. Woods, 'Digital Image Processing', Pearson Education Asia, Third Edition.

[2] S. Jayaraman, E.Esakkirajan and T.Veerkumar, "Digital Image Processing" TataMcGraw Hill Education Private Ltd.

[3]. Anil K. Jain, "Fundamentals and Digital Image Processing", Prentice Hall of India Private Ltd, Third Edition.