



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	T	P	L	T	P	Total
CPE7023	Elective-III Image Processing	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	-	
At end of successful completion of this course, student will be able to		
Course Outcome	CO1	Understand the concept of Digital Image and Video Image
	CO2	Explain image enhancement and Segmentation technique.
	CO3	Develop fast image transform flowgraph.
	CO4	Solve Image compression and decompression techniques.
	CO5	Perform Binary Image Processing Operations.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	1.1	Digital Image and Video Fundamentals: 1.1 Introduction to Digital Image, Digital Image Processing System, Sampling and Quantization, Representation of Digital Image, Connectivity, Image File Formats : BMP, TIFF and JPEG. Colour Models(RGB, HSI, YUV) Introduction to Digital Video, Chroma Sub-sampling, CCIR standards for Digital Video.	1,2,3	06
2	2.1	Image Enhancement: Gray Level Transformations, Zero Memory Point Operations, Histogram, Processing, Neighbourhood Processing, Spatial Filtering, Smoothing and Sharpening Filters. Homomorphic Filtering.	1,2,3	09
3	3.1	Image Segmentation and Representation: Detection of Discontinuities, Edge Linking using Hough Transform Thresholding, Region based Segmentation, Split and Merge Technique, Image Representation and Description, Chain Code, Polygonal Representation, Shape Number, Moments.	1,2,3	09



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4	4.1	Image Transform: Introduction to Unitary Transform, Discrete Fourier Transform(DFT), Properties of DFT, Fast Fourier Transform(FFT), Discrete Hadamard Transform(DHT), Fast Hadamard Transform(FHT), Discrete Cosine Transform(DCT), Discrete Wavelet Transform(DWT)	1,2,3	09
5	5.1	Image Compression: Introduction, Redundancy, Fidelity Criteria.	1,2,3	09
	5.2	Lossless Compression Techniques : Run Length Coding, Arithmetic Coding, Huffman Coding, Differential PCM		
	5.3	Lossy Compression Techniques: Improved Gray Scale Quantization, Vector Quantization, JPEG, MPEG-1.		
6	6.1	Binary Image Processing: Binary Morphological Operators, Hit-or-Miss Transformation, Boundary Extraction, Region Filling, Thinning and Thickening, Connected Component Labeling, Iterative Algorithm and Classical Algorithm.	1,2,3	06
			Total	48

References:

- [1] Rafel C. Gonzalez and Richard E. Woods, 'Digital Image Processing', Pearson Education Asia, Third Edition, 2009,
- [2] S. Jayaraman, E.Esakkirajan and T.Veerakumar, "Digital Image Processing" TataMcGraw Hill Education Private Ltd, 2009,
- [3] Anil K. Jain, "Fundamentals and Digital Image Processing", Prentice Hall of India Private Ltd, Third Edition.
- [4] S. Sridhar, "Digital Image Processing", Oxford University Press, Second Edition, 2012.
- [5] RobertHaralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison Wesley, 1993.
- [6] Dwayne Phillips, "Image Processing in C", BPB Publication, 2006
- [7] B. Chandra and D.DuttaMajumder, "Digital Image Processing and Analysis", Prentice Hall of India Private Ltd, 2011
- [8] Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", Prentice Hall of India Private Ltd, Third Edition
- [9] Fred Halshall, "Multimedia Communications: Applications, Networks Protocols and Standards,", Pearson Education 2001
- [10] David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach", Pearson Education, Limited, 2011