

5 Years Integrated M.Sc.(IT)(Semester - 7)

060010707 – Digital Image Processing Teaching Schedule

Objective of the Course:

To make students understand the fundamentals of digital image and image fundamentals and processing techniques that includes enhancement in spatial domain, segmentation, morphological processing, extracting features, representation and description.

CO1: Describe digital image, its type and processing steps.

CO2: Describe image resolutions, classification of image operations and fundamental tools require in digital image processing.

CO3: Describe and use image enhancement in spatial domain.

CO4: Understand the need of image segmentation and its technique.

CO5: Understand the morphological operations on image.

CO6: Learn and understand the image features representation and description.

Unit	Sub Unit	Topics	No. of Lectures	Reference Chapter/ Additional Reading	Teaching Methodology
1	Introduction to Image Processing				
	1.1	Introduction to Image processing, related fields & its applications	1	SS #1 – Page No. 1-30 RR #1 – Page no 1-5,7-24,20-24,28-30	Discussion & assignment
	1.2	Digital image representation	1		Assignment & Discussion
	1.3	Type of image	1		Chalk & Talk
	1.4	Image processing steps	1		Presentation
2	Digital Image Fundamentals and Operations				
	2.1	Image sampling and quantization	2	SS #2 – Page No. 45-49 RR #2 – Page no 52-54	Presentation
	2.2	Image quality, Image storage and file formats	1	SS #2 – Page No. 50-52, 61-63 RR #2 – Page no 55-63	Presentation and Discussion
	2.3	Basic relationships and distance metrics	3	SS #3 – Page No. 67-74 RR #2 – Page no 68-72	Chalk & Talk
	2.4	Image processing operations	3	SS #3 – Page No. 75-112 RR #2 – Page no 72-97	Presentation
	2.5	Data structures and image processing application development	1	SS #3 – Page No. 113-118	Discussion
3	Image Enhancement in Spatial Domain				
	3.1	Need of image enhancement & its types	1	SS #5 – Page No. 169-177 RR #3 – Page no 104-107	Presentation
	3.2	Point operations	2	SS #5 – Page No. 178-188 RR #2 – Page no 107-119 AJ #7 – Page No 233-240	Chalk & Talk
	3.3	Piece wise linear functions	2		Chalk & Talk
	3.4	Histogram processing	2	SS #5 – Page No. 189-195 RR #2 – Page no 120-144 AJ #7 – Page No 241-243	Chalk & Talk, Pen and Paper

	3.5	Spatial filtering	3	SS #5 – Page No. 196-206, 222-226 RR #2 – Page no 144-172 AJ #7 – Page No 244-252	Chalk & Talk, Demonstration
4	Image Segmentation				
	4.1	Classification of image segmentation algorithm	1	SS #7 – Page No. 286-330 RR #10 – Page No. 689-766	Presentation Slides
	4.2	Detection of discontinuities	2		Chalk & Talk and Presentation Slides
	4.3	Type of edge detectors First-Order and Second Order Edge Detection Operators: Roberts Operators, Prewitt Operators, Sobel Operators, Laplacian Masks	3		
	4.4	Region based segmentation: Region Growing, Region Splitting and Merging	2		
5	Image Morphology				
	5.1	Need of morphology	1	SS #9 – Page No. 375-397 RR #9 – Page No. 627-679	Discussion
	5.2	Structuring elements and primitive morphological operations: erosion, dilation	2		Pen and Paper
	5.3	Compound morphological operations: opening and closing	2		Chalk & Talk
	5.4	The hit or miss transformation	1		Chalk & Talk
	5.5	Basic morphological operations: boundary extraction, hole filling, extraction of connected component, convex hull, thinning, thickening, skeletons,	2		Presentation Slides
	5.6	Gray scale morphology: erosion, dilation, opening, closing, morphological smoothing, morphological gradient, top-hat and bottom hat.	2		Presentation Slides
6	Image Features Representation and Description				
	6.1	Image features characteristics and classification, feature selection process	2	SS #10 – Page No. 408-425 RR #11 – Page No. 795-851	Discussion
	6.2	Boundary representation: chain code and polygonal approximations	2		Pen and Paper
	6.3	Boundary description: simple descriptor, shape number, run-length code and projections	2		Presentation & Demonstration
	6.4	Component labelling	1		

Reference Book:		
1.	Gonzales R., Woods R., Digital Image Processing – Pearson	[RR]
2.	Sridhar S., Digital Image Processing, OXFORD	[SS]
3.	Jain A. – Fundamental of Digital Image Processing. – PHI.	[AJ]