CS410: Digital Image Processing	L	T	P	Nil
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Course Objective: To introduce to the concepts of digital image processing. The students will learn image transforms, image enhancement, restoration, morphological operations, edge detection,and segmentation algorithms.

S. No.	Course Outcomes (CO)
CO1	Describe digital image representation and basic processing concepts.
CO2	Apply gray level transforms, histogram techniques, and spatial filtering.
CO3	Implement Fourier Transform and frequency domain filtering for enhancement.
CO4	Apply noise removal algorithms and perform color model conversions.
CO5	Execute dilation, erosion, and image segmentation techniques.

S. No	Contents	Contact Hours
UNIT 1	Introduction And Digital Image Fundamentals: Digital Image Representation, Fundamental Steps in Image Processing, Elements of Digital image processing systems, Sampling and quantization, some basic relationships like neighbours, connectivity, Distance measure between pixels, Imaging Geometry.	6
UNIT 2	Image Enhancement (Spatial Domain): Gray level transforms, histogram equalization, histogram specification, basics of the spatial filtering, smoothing operators, image gradients, sharpening operators Fuzzy logic: basic definitions, fuzzy operations, fuzzy inference, application of fuzzy logic in image processing.	7
UNIT 3	Image Enhancement (Frequency domain): Two-Dimensional Fourier transform and its properties, basics of frequency domain filtering, smoothing and sharpening in frequency domain.	7

UNIT 4	Image Restoration: modelling of image degradations, noise models, noise removal algorithms for impulse and Gaussian noise, Adaptive filtering, estimation of degradation function, inverse filtering. Color Image Processing: Color models, conversion between different models, color transforms, color smoothing and sharpening	**8**
UNIT 5	Morphological Image Processing: Dilation, Erosion, opening and closing, hit and miss transform, boundary extraction, region filling, thinning, thickening, skeletons, pruning, Gray scale image dilation and erosion.	**6**
UNIT 6	Discontinuity Detection: point, line and edge detection, Sobel, Canny, and LoG edge detectors, edge linking. Image Segmentation: Thresholding, optimal and global thresholding, multiple thresholding, region growing, region splitting and merging, dam construction watershed segmentation algorithm, spatial techniques, frequency domain techniques	**8**
	Total	**42**