

SESSION PLAN

Digital Image Processing, B.Tech IV Year, I Semester.

Sl. No	Topics in JNTU syllabus	Modules and sub modules	Lecture No.	Suggested Books	Remarks
UNIT-I (Digital Image Fundamentals & Image Transforms)					
1	Digital Image fundamentals	Elements of Visual perception , simple Image model	L1	T1-Ch2, T3-Ch2 R2-Ch4	
2	Sampling and Quantization	Uniform sampling and quantization Non-uniform sampling and quantization	L2	T1-Ch2, T3-Ch2 R2-Ch4	
3	Relationship between pixels	Neighbor of a pixel, connectivity ,labeling of connected components and ALU	L3	T1-Ch2, T3-Ch2 R2-Ch4	
4	Image transforms: 2-D DFT Properties	2-D Discrete Fourier transform and its properties. FFT algorithm .	L4-5	T1-Ch3, R2-Ch5	
5	Walsh Transform	Walsh Transform and its representation .	L6	T1-Ch3, R2-Ch5	
6	Hadamard Transform	Hadamard Transform and its representation .	L7	T1-Ch3, R2-Ch5	
7	Discrete Cosine transform	Discrete Cosine Transform and its representation.	L8	T1-Ch3, R2-Ch5	
8	Haar Transform and Slant Transform	Haar Transform and Slant Transform representation and advantages	L9	T1-Ch3, R2-Ch5	
9	Hotelling transform	Hotelling Transform and its representation and advantages	L10	T1-Ch3, R2-Ch5	
Unit-II (Image Enhancement (Spatial Domain))					
10	Introduction, Image Enhancement in spatial domain	Introduction to Spatial Domain methods	L11	T1-Ch4, R2-Ch7	
11	Enhancement through point operation, Types of point operation	Enhancement by point processing methods like image negative, gray-level slicing, bit-plane slicing.	L12	T1-Ch4, R2-Ch7	
12	Histogram manipulation	Histogram processing, Histogram equalization	L13	T1-Ch4, R2-Ch7	
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13	Linear and non-linear gray level transformation Local or neighborhood operation	Mapping, Local enhancement and spatial filtering	L14 L15	T1-Ch4, R2-Ch7	
14	Median filter	Smoothing filter	L16	T1-Ch4, R2-Ch7	
15	Spatial domain high-pass filtering	Sharpening filtering and derivative filters	L17	T1-Ch4, R2-Ch7	
Unit-III Image Enhancement (Frequency Domain)					
16	Filtering in frequency domain	Enhancement in the frequency domain	L18	T1-Ch4, R2-Ch7	
17	Obtaining frequency	Low pass filtering and High pass	L19	T1-Ch4, R2-Ch7	

	domain filters from spatial filters	filtering			
18	Generating filters directly in the frequency domain	Homomorphic filtering	L20	T1-Ch4, R2-Ch7	
19	Low pass (smoothing) in Frequency domain	Butterworth low pass filter in Frequency domain	L21	T1-Ch4, R2-Ch7	
20	High pass (sharpening) filters in Frequency domain	Butter worth high pass filter in Frequency domain	L22	T1-Ch4, R2-Ch7	
Unit-IV (Image Restoration)					
21	Degradation model	Definitions, Degradation model for continuous functions and Discrete formulation	L23	T1-Ch5, R2-Ch8	
22	Algebraic approach to restoration	Unconstrained restoration And constrained restoration	L24	T1-Ch5, R2-Ch8	
23	Inverse filtering	Formulation and removal of blur caused by uniform linear motion	L25	T1-Ch5, R2-Ch8	
24	Least mean square filters,	Wiener filter	L26	T1-Ch5, R2-Ch8	
25	Constrained Least Squares Restoration	Constrained Least Square Restoration	L27	T1-Ch5, R2-Ch8	
26	Interactive Restoration	Interactive Restoration	L28	T1-Ch5, R2-Ch8	
Unit –V (Image segmentation)					
27	Detection of discontinuities	Three basic types of discontinuities : Point, line and Edge detection.	L29	T1-Ch7, R2-Ch9 T3-Ch6	
28	Edge linking and boundary detection	Local processing and global processing	L30	T1-Ch7, R2-Ch9 T3-Ch6	
29	Threshold	Foundation, simple global thresholding and optimal thresholding	L31-32	T1-Ch7, R2-Ch9 T3-Ch6	
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30	Region oriented segmentation	Basic formulation, Region growing by Pixel aggregation And Region splitting and merging	L33-34	T1-Ch7, R2-Ch9 T3-Ch6	
Unit VI (Image Compression)					
31	Redundancies and their removal methods, Fidelity criteria	Data compression using coding redundancy, inter pixel redundancy and psycho visual redundancy. Objective fidelity and Subjective fidelity criteria	L35	T1-Ch6, T3-Ch14 R2-Ch11	
32	Image compression models	A general compression model	L36	T1-Ch6, T3-Ch14 R2-Ch11	
33	Source encoder and decoder	Source encoder and decoder model	L37	T1-Ch6, T3-Ch14 R2-Ch11	

34	Error -free compression	Variable length coding, Bit plane coding and lossless predictive coding	L38-39	T1-Ch6, T3-Ch14 R2-Ch11	
35	Lossy Compression	Lossy predictive coding and Transform coding	L40	T1-Ch6, T3-Ch14 R2-Ch11	
36	JPEG 2000 Standards	Still image compression standard	L41	T1-Ch6, T3-Ch14 R2-Ch11	
Unit VII (Wavelet based Image processing)					
37	Introduction to wavelet transform	Importance of Wavelet transform and applications	L42	T3-Ch3, R6-Ch1	
38	Continuous wavelet Transform(CWT) and Discrete Wavelet Transforms(DWT)	Definition and properties of CWT and DWT	L43	T3-Ch3, R6-Ch1	
39	Filter banks	Decomposition using Filter banks	L44	T3-Ch3, R6-Ch2	
40	Wavelet based Image compression	Image compression using DTWT Embedded Tree image coding	L45	T3-Ch3, R6-Ch5	
41	Wavelet based de noising	Wavelet denoising Speckle removal	L46	T3-Ch3, R6-Ch6	
42	Wavelet thresholding methods	Edge detection and object isolation	L47	T3-Ch3, R6-Ch6	
Unit VIII (Morphological Image Processing)					
43	Dilation and Erosion	Basic definitions	L48	T1-Ch8	
44	Structuring Element Decomposition	Structuring Element Decomposition	L49	T1-Ch8	
45	The Strel function	The Strel function	L50	T1-Ch8	
46	Erosion	Erosion	L51	T1-Ch8	
47	Combining Dilation and Erosion	Combining Dilation and Erosion	L52	T1-Ch8	
48	Opening Watermarking methods	Opening Watermarking methods	L53	T1-Ch8	