

4/4 B.Tech - SEVENTH SEMESTER

EC 7T2

Digital Image Processing

Credits: 4

Lecture : 4 periods/week

Tutorial: 1 period /week

Internal assessment: 30 marks

Semester end examination: 70 marks -----

Course Objectives:

- To acquire the fundamentals of image processing and mathematical transforms necessary for image processing.
- To provide the details of image enhancement in spatial and frequency domains
- To study the image compression, and restoration techniques
- To attain knowledge in image segmentation and representation techniques

Learning Outcomes:

The students undergoing this course will know

- The fundamental steps of image processing.
- Various transforms used in image processing.
- About the various techniques of image enhancement, reconstruction, compression and segmentation and their applications.

UNIT- I

Digital image fundamentals: Digital Image Representation, Fundamental steps in image processing, Concept of gray levels. Gray level to binary image conversion, Sampling and quantization. Relationship between pixels, Imaging Geometry.

UNIT- II

Image Transforms: 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform.

UNIT- III

Image enhancement: Point processing, Histogram processing, Spatial filtering.

UNIT- IV

Image Enhancement in frequency domain: Image smoothing, Image sharpening.

UNIT- V

Colour image processing : Color fundamentals, Color models, Pseudo colour image processing, full colour image processing.

UNIT- VI

Image Restoration : Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT -VII

Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

UNIT- VIII

Image compression: Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression.

Learning Resources

Text Books:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2rd Edition, 2002.
2. Digital Image processing- S Jayaraman, S Esakkirajan and T. Veerakumar, TMH, 3rd Edition, 2010.

References:

1. Fundamentals of Digital Image processing – A.K.Jain, PHI. 1989
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L.Edition, PEA, 2004.
3. Digital Image Processing – William K. Pratt, John Wiley, 3rd Edition, 2004.
4. The Essential Guide to Image Processing-Alan c. Bovik, Academic Press, 2009.