4/4 B.Tech - SEVENTH SEMESTER

EC 7T2 **Digital Image Processing** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Pre Requisites: Digital Signal Processing (EC5T6)

Course Objectives:

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

Learning Outcomes:

Student will be able to

- Analyze different types of images, colour models and various transforms.
- Improve the quality of images using Spatial and frequency domain filtering.
- Apply the restoration techniques to improve the fidelity of images.
- Design the techniques for image compression, image Segmentation for various 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, Resolution, Relationship between pixels.
Image Transforms: 2-D discrete fourier transform and its Properties, Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform.

UNIT II

Image Enhancement in Spatial Domain: Point processing, Histogram processing, Image smoothing & Image sharpening.
Image Enhancement in frequency Domain: Steps involved in frequency domain filtering, Image smoothing & Image sharpening.

UNIT III

Image compression: Redundancies and their removal methods, Fedility criteria, Image compression models, lossy and lossless compression.

UNIT IV

Image segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region – oriented segmentation.

UNIT V

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

Morphological processing: Erosion, Dilation, Opening, closing operations, Hit or Miss transform, Boundary detection, Region filling, Thinning and Thickening.

Learning Resources

Text Books:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 3rd Edition, 2002.

References:

1. Fundamentals of Digital Image processing – A.K.Jain, PHI. 1989
2. Digital Image processing- S Jayaraman, S Esakkirajan and T. Veerakumar.TMH, 3rd Edition, 2010.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. The Essential Guide to Image Processing-Alan c. Bovik, Academic Press, 2009.

Web Resources:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/Digi_Img_Pro/ui/TOC.htm
2. http://nptel.iitm.ac.in/video.php?subjectId=117105079
3. http://en.wikipedia.org/wiki/Digital_image_processing.
4. http://www.filestube.com/d/digital+image+processing+gonzalez+solution.