# SHAMBHUNATH INSTITUTE OF ENGINEERING & TECHNOLOGY

## Department of Computer Science & Engineering (2019-20)

## SUBJECT LECTURE PLAN

**Faculty Name: Niraj Kumar Tiwari**

**Subject Name:** Image Processing
**Subject Code:** RCS-082
**Total Lectures:** 48
**Course :** B. Tech CS 8th SEM

| Unit | Name of Topic | Lect. |
|---|---|---|
| **Unit-I DIGITAL IMAGE FUNDAMENTALS** | Introduction to Digital image Processing | L-1 |
| | Steps in Digital Image Processing | L-2 |
| | Components of Image Processing System | L-3 |
| | Elements of Visual Perception | L-4 |
| | Structure of Human Eye ,Image Formation in the Eye | L-5 |
| | A Simple Image Model | L-6 |
| | Sampling and Quantization | L-7 |
| | Relationships between pixels | L-8 |
| | Color image fundamentals | L-9 |
| | RGB, HSI models, | L-10 |
| | Two-dimensional mathematical preliminaries | L-11 |
| | 2D transforms | L-12 |
| | DFT, DCT. | L-13 |
| **Unit-II IMAGE ENHANCEMENT** | Spatial Domain: Gray level transformations | L-14 |
| | Histogram processing | L-15 |
| | Basics of Spatial Filtering– | L-16 |
| | Smoothing and Sharpening Spatial Filtering | L-17 |
| | Frequency Domain: Introduction to Fourier Transform | L-18 |
| | Smoothing and Sharpening frequency domain filters | L-19 |
| | Ideal, Butterworth and Gaussian filters | L-20 |
| | Homomorphic filtering, Color image enhancement. | L-21 |
| **Unit-III IMAGE RESTORATION** | Image Restoration | L-22 |
| | Degradation model, Properties, | L-23 |
| | Restoration in the presence of Noise only Spatial Filtering | L-24 |
| | Noise models, Mean Filters, | L-25 |
| | Order Statistics – Adaptive filters | L-26-27 |
| | Band reject Filters – Band pass Filters | L-28-29 |

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|---|---|---|
| | Notch Filters – Optimum Notch Filtering | L-30 |
| | Inverse Filtering – Wiener filtering | L-31 |
| **UNIT-IV IMAGE SEGMENTATION** | Edge detection | L-30 |
| | Edge linking via Hough transform, Thresholding | L-31 |
| | Region based segmentation | L-32 |
| | Region growing | L-33 |
| | Region splitting and merging | L-34 |
| | Morphological processing- erosion and dilation, | L-35 |
| | Segmentation by morphological watersheds – basic concepts – Dam construction | L-36 |
| | Watershed segmentation algorithm. | L-37 |
| **UNIT-V IMAGE COMPRESSION AND RECOGNITION** | Need for data compression | L-38 |
| | Huffman, Run Length Encoding | L-39 |
| | Shift codes, Arithmetic coding | L-40 |
| | JPEG standard, MPEG | L-41 |
| | Boundary representation | L-42 |
| | Boundary description | L-43 |
| | Fourier Descriptor | L-44 |
| | Regional Descriptors | L-45 |
| | Topological feature, Texture | L-46 |
| | Patterns and Pattern classes | L-47 |
| | Recognition based on matching | L-48 |

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## Text books:

**1**. Rafael C. Gonzalez, Richard E. Woods,Digital Image Processing Pearson, Third Edition, 2010
**2**. Anil K. Jain,Fundamentals of Digital Image Processing Pearson, 2002.
**3**. Kenneth R. Castleman,Digital Image Processing Pearson, 2006.
**4**. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
**5**. D,E. Dudgeon and RM. Mersereau,Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.
**6**. William K. Pratt,Digital Image Processing John Wiley, New York, 2002
**7.** Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2nd edition 1999.