INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE: **Electronics and Computer Engineering**

1. Subject Code: **EC - 384** Course Title: **Digital Image Processing**

2. Contact Hours: **L: 3** **T: 0** **P: 0**

3. Examination Duration (Hrs.): **Theory** 0 0 **Practical** 0 0

4. Relative Weight: **CWS** 15 **PRS** 00 **MTE** 35 **ETE** 50 **PRE** 00

5. Credits: 0 3 6. Semester: [ ] **Autumn** [√] **Spring** [ ] **Both**

7. Pre-requisite: **EC - 202**

8. Subject Area: **DEC**

9. Objective: To acquaint the students with the fundamental concepts of digital image processing and its applications.

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	**Digital Image Fundamentals:** Simple image model, sampling and quantization, imaging geometry, digital geometry, different types of digital images.	3
2.	**Bilevel Image Processing:** Digital distance, distance transform, medial axis transform, component labeling, thinning, morphological processing, extension to grey scale morphology.	4
3.	**Binarization and Segmentation of Grey Level Images:** Histogram of grey level images, optimal thresholding, multilevel thresholding; Segmentation of grey level images, watershed algorithm for segmenting grey level images.	5
4.	**Detection of Edges and Lines in 2D Images:** First order and second order edge operators, multi-scale edge detection, Canny's edge detection algorithm, Hough transform for detecting lines and curves, edge linking.	6
5.	**Image Enhancement:** Point processing, spatial filtering, frequency domain filtering, multi-spectral image enhancement, image restoration.	6
6.	**Color Image Processing:** Color representation, laws of color matching, chromaticity diagram, color enhancement, color image segmentation, color edge detection, color demosaicing.	6

7.	**Image Registration and Depth Estimation:** Registration algorithms, stereo imaging, computation of disparity map.	6
8.	**Image Compression:** Lossy and lossless compression schemes, prediction based compression schemes, vector quantization, sub-band encoding schemes, JPEG compression standard, fractal compression scheme, wavelet compression scheme.	6
	Total	**42**

11. Suggested Books:

Sl. No.	**Name of Books/Authors**	**Year of Publication**
1.	Gonzalez, R. C., Woods, R. E. and Eddins, S. L., "Digital image Processing Using MATLAB", 3rd Ed., Prentice-Hall.	2008
2.	Jahne, B., "Digital Image Processing", 5th Ed., Springer.	2003
3.	Pratt, W. L., "Digital Image Processing", 3rd Ed., John Wiley & Sons.	2001
4.	Sonka, M., Hlavac, V. and Boyle, R., "Image Processing, Analysis and Machine Vision", 3rd Ed., PWS Publishing.	1998