SVKM's Narsee Monjee Institute of Management Studies Mukesh Patel School of Technology Management and Engineering	CE-52

Program: B. Tech (Computer Science and Business Systems)				**Semester:** VIII	
Course/Module : Image Processing and Pattern Recognition (Elective VI)				**Module Code:**	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks -50)**	**Term End Examinations (TEE) (Marks -100 in Question Paper)**
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Calculus and probability, Basic programming skills

Objective:
To be familiar with processing of images, recognition of the pattern and their applications.

Outcomes:

1. Understand the fundamentals of image processing.
2. Compute and analyse effects of various image transformation techniques in spatial domains and colour image processing.
3. Analyse images using image segmentation and morphological operations.
4. Analyse images using the concept of image registration.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** Image processing systems and its applications. Basic image file formats	02
2	**Image formation:** Geometric and photometric models; Digitization - sampling, quantization; Image definition and its representation, neighbourhood metrics.	04
3	**Intensity transformations and spatial filtering:** Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.	08
4	**Segmentation:** Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform.	08
5	**Image/Object features extraction:** Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull;	07

	Distance transform, medial axis transform, skeletonization/thinning, shape properties.	
6	**Registration:** Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.	07
7	**Colour image processing:** Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation.	05
8	**Morphological Filtering Basics:** Dilation and Erosion Operators, Top Hat Filters.	04
	Total	**45**

Text Books:

1. *Digital Image Processing.* R. C. Gonzalez and R. E. Woods, Prentice Hall, 4th Edition, 2018

References:

1. *Image Processing: The Fundamentals.* Maria Petrou and Panagiota Bosdogianni, John Wiley & Sons, Ltd.
2. *Digital Image Processing.* K. R. Castleman:, Prentice Hall, Englewood Cliffs.
3. *Visual Reconstruction.* A. Blake and A. Zisserman, MIT Press, Cambridge.
4. *Digital Pictures.* A. N. Netravali and B. G. Haskell, Plenum Press.
5. *Digital Images and Human Vision.* A. B. Watson:, MIT Press, Cambridge.

Any other information:

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	**50**

Details of Term work:

Class Test/Assignments/ Case Studies / Projects / Presentations

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Signature Signature

(Prepared by Concerned Faculty/HOD) (Approved by Dean)