Computer Vision

Course Code:		**Year:**	III	**Semester:**	I
Course Category:	**Honors**	**Branch:**	CSE	**Course Type:**	Theory
Credits:	4	**L-T-P:**	4-0-0	**Prerequisites:**	Calculus &Linear Algebra, Probability Theory
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		
CO1	Understand the fundamental concepts of Computer Vision	**L2**
CO2	Apply Image transformation methods to view 2D and 3D images.	**L3**
CO3	Apply various Computer Vision techniques to develop applications	**L3**

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3													
CO2	3								2	2				3
CO3	3								2	2				3

Course Contents		
UNIT-1	Introduction: What is Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications: Optical character recognition (OCR), Machine inspection, 3D model building (photogrammetry), Medical imaging, Automotive safety, Motion capture, Surveillance, Fingerprint recognition and biometrics, Morphing, Video match move and stabilization, Face detection.	**CO1**
UNIT-2	Image Formation Models: Geometric primitives and transformations: The digital camera.	**CO1,CO2**
UNIT-3	Image Processing, Feature detection and matching: Points and patches, Edge detection, Edge linking, Lines. Regularization theory, Stereo vision, Structure from motion.	**CO1,CO3**
UNIT-4	Shape Representation and Segmentation: Snakes and active contours, Level set representations, Split and merge, Fourier, and wavelet, Mean shift and mode finding, Graph cut method.	**CO1,CO3**
UNIT-5	Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition	**CO1,CO3**

Learning Resources
Text Books
1. Computer Vision: Algorithms and Applications, R. Szeliski, 2011, Springer. 2. Computer Vision: A Modern Approach, D. Forsyth and J. Ponce, 2nd ed, 2011,Prentice Hall.
Reference Books
1. *Computer & Machine Vision*, E. R. Davies, 2012, Academic Press. 2. *Computer Vision*, Dana H. Ballard, Christopher M. Brown, 1st Edition, Prentice Hall 1982 3. Fundamentals of Computer Vision, Shah M., 1997.
e- Resources & other digital material
1. https://sites.usc.edu/iris-cvlab/ 2. https://onlinecourses.nptel.ac.in/noc21_ee23/preview 3. https://nptel.ac.in/courses/106105216 4. https://nptel.ac.in/courses/108103174 5. https://www.coursera.org/learn/introduction-computer-vision-watson-opencv 6. https://www.coursera.org/projects/computer-vision-opencv-for-images