MCA101 COMPUTER GRAPHICS				
	L	T	P	Cr
	3	0	2	4.0

Course Objective: Detailed study of computer graphics, 2 D and 3 D transformations, representations and visualization.

Fundamentals of Computer Graphics: Overview of Computer Graphics, Computer Graphics Applications and Software, , Video Display Devices, Random scan displays, Raster scan displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.

Graphics Primitives: Scan converting line, circle, ellipse, arcs & sectors, Boundary Fill & Flood Fill algorithm, Color Tables.

Transformations: Homogeneous Coordinates, 2D and 3D Scaling, Translation, rotation, shearing & reflection, Composite transformation, Window to View port transformation.

Clipping: Cohen Sutherland, Liang Barsky, Nicholl – Lee – Nicholl Line clipping algorithms, Sutherland Hodgeman, Weiler Atherton Polygon clipping algorithm.

Three Dimensional Object Representations: Parallel & Perspective projection, Vanishing Points,. Curved lines & Surfaces, Spline representations, Spline specifications, Bezier Curves & surfaces, B-spline curves & surfaces.

Basic Rendering: Rendering in nature, Polygonal representation, Affine and coordinate system transformations, Visibility and occlusion, depth buffering, Painter's algorithm, ray tracing, forward and backward rendering equations.

Visualization: Visualization of 2D/3D scalar fields: color mapping, isosurfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of: Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization.

Laboratory work: Lab work should be done in OpenGL. Covers all the basic drawing, filling, transformation and clipping algorithms.

Recommended Books:

1. Donald D Hearn, M. Pauline Baker, Computer Graphics C version, Pearson Education, 2nd ed.
2. James D. Foley, Andries van Dam, Steven K. Feiner and John F. Hughes, Computer Graphics: Principles & Practice in C, Addison Wesley Longman.
3. Zhigang Xiang, Roy A Plastock, Computer Graphics, Schaums Outline, TMH.
4. Donald D Hearn ,Computer Graphics with OpenGL, Pearson Education,,4th edition,2013
5. OpenGL Programming Guide: The Official Guide to Learning OpenGL, Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis, 5th Edition, 2013
6. Alexandru C. Telea, Data Visualization: Principles and Practice, A. K. Peters Ltd., 2007.

COURSE LEARNING OUTCOMES (CLOs): On completion of this course, students will be able to

CLO1	Able to comprehend the concepts related to basics of computer graphics and visualization.
CLO2	Skilled to know and simulate the various graphics transformations and clipping techniques.
CLO3	Able to grasp the concepts related three dimensional object representations.
CLO4	To learn and program in OpenGL.
CLO5	Able to understand the methods, applications of 2D and 3D visualization.