

SUBJECT: COMPUTER SCIENCE							
DSE	BCS-E603	Computer Graphics	L	T	P	C	Time for ESE
			4	-	-	4	3 Hrs.
Pre- requisite: Knowledge of C++, calculus, linear algebra, integra, vectors, matrices, basis, solving systems of equations.							
Course Objectives:							
<ul style="list-style-type: none"> To understand the basics of various inputs and output computer graphics hardware devices. To know 2D raster graphics techniques, 3D modelling, geometric transformations, 3D viewing and rendering. 							
Course Outcomes:							
CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.						
CO2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.						
CO3	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.						
CO4	Render projected objects to naturalize the scene in 2D view and use of illumination models for this.						
CO5	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.						
Course Contents							
UNIT	Contents						Lectures Required
1.	Introduction to Computer Graphics: Video display devices, Raster- scan systems, Random- scan systems, Graphics monitors and workstations, Input devices, hardcopy devices, Computer graphics software. Point plotting techniques: Points and lines, line- drawing algorithm, Circle generating algorithms, Ellipse-generating algorithms.						8
2.	Two-Dimensional Transformations: Transformations of Points, Transformations of Straight Lines, Mid-Point Transformations, Transformations of Parallel Lines, Transformations of Intersecting Lines, Rotation, Reflection, Scaling, Projection, Combined Transformation, Transformation of the unit square.						8
3.	Three-Dimensional Transformation: Introduction to Three- Dimensional Transformation, 3-D Scaling, Shearing, Rotation, Reflection, Projection and Translation, Multiple Transformation, Rotation about an Axis parallel to a Coordinate Axis, rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane.						8
4.	Two-Dimensional Viewing: viewing pipeline, viewing coordinate reference frame, window- to- viewport coordinate transformation, Clipping operations, point clipping, Cohen- Sutherland line clipping, Sutherland-Hodgeman polygon clipping, Curve clipping, Text clipping, Exterior clipping.						8
5.	Visible Surface Detection Methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP tree methods, area sub-division and						8

	octree methods.	
6.	Computer Animation: Design of animation sequences, General computer-animation functions, Raster animations, Computer-animation languages, Key-frame systems morphing simulating accelerations, Motion specifications.	8
Total Lectures		48

Suggested Text Book(s):

1.	Hearn D., Baker P.M., Computer Graphics, Prentice-Hall of India.
2.	Rogers and Adams, Mathematical Elements of Computer Graphics, McGraw Hill Book Co.

Suggested Reference Book(s):

1.	Newman, W., Sproul, R.F., Principles of Interactive Computer Graphics, McGraw- Hill.
2.	John F. Hughes et. al., Computer Graphics: Principles and Practice, Addison-Wesley Professional.

Other Useful Resource(s)

1.	https://nptel.ac.in/courses/106106090
2.	https://nptel.ac.in/courses/106102065
3.	https://ocw.mit.edu/courses/6-837-computer-graphics-fall-2012/pages/lecture-notes/

Course Outcomes Contributed to Programme Outcomes

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	AVERAGE
CO1	1	1	1	1	1	2	1	1	1.1
CO2	2	2	2	2	1	2	2	1	1.8
CO3	3	2	2	2	2	3	2	2	2.3
CO4	3	2	2	2	2	3	2	2	2.3
CO5	2	2	2	2	2	3	2	3	2.3
AVG.	2.2	1.8	1.8	1.8	1.6	2.6	1.8	1.8	1.9

Course Outcomes Contributed to Programme Specific Outcomes

PSO→ CO↓	PSO1	PSO2	PSO3	AVERAGE
CO1	1	-	1	0.7
CO2	3	2	3	2.7
CO3	2	2	3	2.3
CO4	2	2	3	2.3
CO5	3	2	3	2.7
AVG.	2.2	1.6	2.6	1.9