Discipline	COMPUTER SCIENCE				
Course Code	UK3DSCCSC203				
Course Title	COMPUTER GRAPHICS				
Type of Course	DSC				
Semester	III				
Academic Level	2				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5 hours
Pre-requisites	Basic C programming Skill is necessary.				
Course Summary	This course is designed to familiarise the various algorithms in computer graphics using the C programming language.				

Detailed Syllabus:

Module	Unit	Content	Hrs (L+P)
I	**Introduction**		**15**
	1	Computer graphics, application of computer graphics, pixel, resolution, aspect ratio, frame buffer, Raster scan, horizontal and vertical retrace, Random scan, video adapter, video controller, Graphics card.	
	2	Display devices- LCD, LED, DVST, 3D viewing devices, stereoscopic and virtual reality systems,	
	3	Properties of Light, Color models (RGB, YIQ, CMY, HSV.	
II	**Output primitives**		**15**
	4	Coordinate systems- modelling coordinates, world coordinates, device coordinates	

	5	Output primitives: Straight line, DDA algorithm, Bresenham's Line drawing algorithm, midpoint circle algorithm.	
	6	Polygon filling algorithms-boundary fill, flood fill, scan line algorithm	
III	**Two dimensional transformations and clipping**		**15**
	7	Basic transformations: Translation, Rotation, Scaling, homogeneous coordinates for uniform matrix operations, composite transformation	
	8	Other transformations: reflection, shearing, transformations with respect to arbitrary points, matrix formulation and concatenation of transformations	
	9	2D clipping; clip window, Point clipping, Line clipping, Cohen-Sutherland Line Clipping algorithms, Midpoint subdivision algorithm.	
IV	**3D concepts and techniques**		**15**
	10	3D display techniques, 3D object representations, basic 3D transformations	
	11	Projections: parallel and perspective projections.	
	12	Visible surface detection algorithms-scan line method, Z buffer algorithm, A- buffer algorithm, depth sorting.	
V	**Flexi Module** (Not for end semester Examination)		**15**
	13	Curves: B-Spline, Bezier	
	14	Animation: Morphing, Tweening, Zooming, Panning, Scissoring	
	15	Shading	

References

1. Donald D. Hearn, M. Pauline Baker, "Computer Graphics" (C Version) 2/e , Pearson

https://archive.org/details/DonaldHearnM.PaulineBakerComputerGraphicsBookFi.org/page/n58/mode/1up (pdf link)

2. Zhigand xiang, Roy Plastock, "Computer Graphics Second edition", Schaum's outlines, Tata Mc Graw hill edition.

3. Amarendra N Sinha and Arun D Udai, Computer Graphics, McGraw Hill Publications.

4. Foley, Van Dam, Feiner and Hughes, "Computer Graphics Principles & practice", second edition in C, Pearson Education.

5. David F Rogers, “Procedural elements for Computer Graphics”, Tata Mc Graw hill, 2nd edition.

NPTEL Web Course:

1. http://nptel.ac.in/courses/106106090/

NPTEL Video Course:

1. http://nptel.ac.in/courses/106106090/#

Lab Exercises

1.Use functions to draw different shapes

2. Implementing DDA algorithm

3. Implementing Bresenham’s line drawing algorithm

4. Implementing Midpoint circle generation algorithm

5. Implementing Boundary fill & flood fill algorithm

6. Program for performing the basic 2D transformations such as translation, Rotation, Scaling for a given 2D object

7. Program for performing the other 2D transformations Reflection along x-axis and y-axis, x direction shearing and y- direction shearing for a given 2D object

8. Implement composite transformations

9. Program for performing the basic 3D transformations such as translation, Rotation, Scaling for a given 3D object (Hint: bar3d() from graphics.h)

10. Programs for designing simple animations using transformations

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Outline the basic principles of computer graphics, different input/output devices and graphic operations.	U	PSO-1, 2, 3
CO-2	Experiment with algorithms to generate computer graphic primitives, specifically straight line and polygon filling.	Ap	PSO-1, 2, 3
CO-3	Illustrate 2D transformations and clipping operations in computer graphics, different methods for transformations.	Ap	PSO-1,2, 3
CO-4	Demonstrate 3D computer graphics techniques, the concept of projections and various surface detection algorithms.	Ap	PSO-1, 2, 3

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Note: 1 or 2 COs/module

Name of the Course: COMPUTER GRAPHICS

Credits: 3:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	Outline the basic principles of computer graphics, different input/output devices and graphic operations.	PO-3, 6, 7 PSO-1, 2, 3	U	F, C	L	P
2	Experiment with algorithms to generate computer graphic primitives, specifically straight	PO-2, 3, 6, 7 PSO-1,2,3	Ap	F, C, P	L	P

	line and polygon filling.					
3	Illustrate 2D transformations and clipping operations in computer graphics, different methods for transformations.	PO-2,3, 6,7 PSO-1,2,3	Ap	F, C, P	L	P
4	Demonstrate 3D computer graphics techniques, the concept of projections and various surface detection algorithms.	PO-2, 3, 6, 7 PSO-1, 2	Ap	F, C	L	-

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO-1	1	-	1	-	-	-	2	-	2	1	2	-
CO-2	2	2	1	-	-	1	2	-	2	2	2	-
CO-3	2	2	1	-	-	1	2	-	2	2	2	-
CO-4	2	2	1	-	-	1	2	-	2	2	-	-

Correlation Levels:-