

PG DEPARTMENT OF COMPUTER SCIENCE				CLASS: <i>IM.Sc.</i> Computer Science				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours/week	CIA	Ext	Total
II	Major Core – 6	21P2DMC6	Computer Graphics	4	5	25	75	100

Nature of Course			
Knowledge and skill			Employability oriented
Skill oriented	✓		Entrepreneurship oriented

Course Objectives

1. To understand basic display system, display mechanisms and Shapes Algorithms.
2. To know about the colour models and Attributes, Various transformation Techniques.
3. To implement various Clipping Techniques. To Impart Viewing Concepts.
4. To apply various 3D Viewing Transformation Techniques.
5. To understand necessary approaches and techniques to the graphics system in order to provide effective view of surfaces to users.

Unit	Content	Hrs	K-Level	CLO
I	A Survey of Computer Graphics: A Survey of Computer Graphics: Computer Aided Design – Presentation Graphics – Image Processing – Graphical User Interfaces. Overview: Video display devices – Refresh Cathode-Ray Tubes – Raster scan Displays – Random Scan Displays – Flat Panel Displays – Graphics Software. Output Primitives: Points and Lines – Line drawing algorithms – Line Functions – Circle Generating Algorithms – Filled Area Primitives – Character Generation.	15	Up to K3	1
II	Attributes of Output Primitives: Attributes of Output Primitives: Line Attributes – Colour and Gray scale Levels – Area Fill Attributes – Character Attributes – Bundled Attributes. Two Dimensional Geometric Transformations: Basic Transformation – Matrix Representations – Composite Transformations – Other Transformations.	15	Up to K2	2
III	Two-Dimensional Viewing: Two-Dimensional Viewing: The Viewing Pipeline – Viewing Coordinate Reference Frame – Window to Viewport Coordinate Transformation – Clipping Operations – Point Clipping – Line Clipping – Polygon Clipping. Graphical User Interfaces and Interactive Input Methods: Input of Graphical Data – Input Functions – Interactive Picture Construction Techniques.	15	Up to K3	3

IV	Three-Dimensional Display Methods: Three-Dimensional Display Methods: Three-Dimensional Display Methods – Three-Dimensional Graphics. Three Dimensional Geometric and Modelling Transformations: Translation – Rotation – Scaling – Other Transformations – Composite Transformations – Three-Dimensional Transformation functions.	15	Up to K4	4
V	Three-Dimensional Viewing : Three-Dimensional Viewing: Viewing Pipeline – Viewing Coordinates – Projections. Visible Surface Detection Methods: Classification of Visible Surface Detection Algorithms – Back Face Detection – Depth Buffer Method – Scan Line Method – Octree Methods- Ray Casting Methods.	15	Up to K4	5

Book for Study

“Computer Graphics” by Donald Hearn M. Pauline Baker, Second Edition, Pearson Education, 2007.

Chapters

Unit – I: 1.1, 1.2, 1.7, 1.8, 2.1, 2.7, 3.1, 3.2, 3.4, 3.5, 3.11, 3.14

Unit – II: 4.1, 4.3 – 4.6, 5.1, 5.2, 5.3, 5.4

Unit – III: 5.1 – 5.4, 6.1 – 6.3, 6.5 – 6.8, 8.2, 8.3, 8.5

Unit – IV: 9.1, 9.2, 11.1 – 11.6

Unit – V: 12.1 – 12.3, 13.1 – 13.3, 13.5, 13.9, 13.10

Books for Reference

1. “Computer Graphics using Open GL” by F.S Hill, JR, Second Edition, PHI, 2005
2. “Computer Graphics for Scientists and Engineers” by R.G.S Asthana, N. K. Sinha, Second Edition, New Age international Publishers, 2003
3. “Interactive Computer Graphics” by Neuman and Sproull, MC Graw Hill ISE, 1993.
4. “Principles of Interactive Computer Graphics” by William M. Newman and Robert F. Sproull – TMH – 1986.

Web Resources

1. https://www.tutorialspoint.com/computer_graphics/line_generation_algorithm.html
2. <https://www.gatevidyalay.com/tag/2d-and-3d-transformation-in-computer-graphics-ppt/>
3. <https://www.geeksforgeeks.org/z-buffer-depth-buffer-method/>

Rationale for Nature of the course

- Develop cognitive and practical skills such as graphical communications, spatial visualization, creative problem solving, design capabilities and modelling, both physically and logically through Computer graphics.

Activities on Skill Oriented

- Practice to write Algorithms
- Quiz
- Seminar

Pedagogy

Chalk and Talk, PPT, Materials, Assignments, Seminar, Problem Solving, Group Discussion, and Interaction.

Course Designer(s) Name

1. Mrs. S. Sasikala
2. Mrs. S. Rajalakshmi

Lesson Plan

Unit	Topics to be covered	Hours	Mode
I	A Survey of Computer Graphics	3	Lecture
	Graphical User Interfaces	5	Lecture, GD
	Output Primitives	7	Lecture
II	Output Primitives	7	Lecture
	2D Geometric Transformations	8	Lecture
III	Viewing	5	Lecture
	Clipping	5	Lecture
	Graphical User Interfaces and Interactive Input Methods	5	Lecture, PPT
IV	3D Display Methods	5	Lecture
	3D Geometric and Modeling Transformations	10	Lecture
V	3D Viewing	7	Lecture
	Visible Surface Detection Methods	8	Lecture, PPT, Assignment

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLOs	COURSE LEARNING OUTCOMES	K - Levels
CLO 1	Utilize the fundamentals of Graphics system and model various Drawing Algorithms	Up to K3
CLO 2	Understand the fundamental output primitives and 2D Geometric Transformation Techniques.	Up to K2
CLO 3	Evaluate different 2D Viewing Concepts and various Interactive Input Methods.	Up to K3
CLO 4	Apply 3D Geometric Transformation in Computer Graphics.	Up to K4
CLO 5	Classify various Visible Surface Detection Methods to Display Images.	Up to K4

Mapping of CLOs with PO

CLO / PO	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	2	1	1	-	-	-
CLO 2	2	3	3	3	1	-
CLO 3	2	3	2	2	1	-
CLO 4	2	3	3	3	3	2
CLO 5	2	3	3	3	3	2

(3 –Advanced Application, 2 – Intermediate Level, 1- Basic Level)

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K4
Seminar	5	K4
Quiz	5	K4
Total	25	

Learning Outcome Based Education & Assessment (LOBE)

Formative - Blue Print – Model for Computer Graphics

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Internal	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
CIA I	CLO 1	Up to K3	2	K1	2(K2&K2)	2(K3)
	CLO 2	Up to K2	3	K1	2(K1&K1)	1(K2)
CIA II	CLO 3	Up to K3	2	K2	2(K3&K3)	2(K3)
	CLO 4	Up to K4	3	K2	2(K4&K4)	1(K4)
Question Pattern (CIA I & II)	No. of Questions to be asked		5		4	3
	No. of Questions to be answered		5		2	2
	Marks for each question		2		5	10
	Total Marks for each section		10		10	20

- CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Distribution of Section-wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated %
K1	10	10	-	20	33.33	67
K2	-	10	10	20	33.33	
K3	-	-	20	20	33.33	33
K4	-	-	-	-	-	-
Total Marks	10	20	30	60	100	100

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	-	-	-	-	-	17
K2	10	-	-	10	16.67	
K3	-	10	20	30	50	50
K4	-	10	10	10	33.33	33
Total Marks	10	20	30	60	100	100

Learning Outcome Based Education & Assessment (LOBE)

Summative - Blue Print – Model for Computer Graphics

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

S.No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No of Questions	K - Level	No of Questions	K - Level		
1	CLO 1	Up to K3	2	K2 & K3	1	K1	2(K2&K2)	1(K3)
2	CLO 2	Up to K2	2	K1& K1	1	K1	2(K1&K1)	1(K2)
3	CLO 3	Up to K3	2	K2 & K3	1	K2	2(K3&K3)	1(K3)
4	CLO 4	Up to K4	2	K3 & K4	1	K2	2(K4&K4)	1(K4)
5	CLO 5	Up to K4	2	K3& K4	1	K3	2(K4&K4)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers
- K3 – Application oriented – Solving Problems
- K4 – Examining, analyzing, presentation and make inferences with evidences

Distribution of Section – wise Marks with K Levels

K Levels	Section A (No Choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total Marks	% of Marks without choice	Consolidated
K1	2	4	10	-	16	13.33	13%
K2	2	4	10	10	26	21.67	22%
K3	4	2	10	20	36	30.00	30%
K4	2	-	20	20	42	35	35%
Total Marks	10	10	50	50	120	100	100%