Ref No:

Sri Krishna Institute of Technology, Bangalore

COURSE PLAN

Academic Year 2019-2020

Program:	B E – Computer Science & Engineering
Semester :	6
Course Code:	17CS62
Course Title:	Computer Graphics and Visualization
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	Priyanka H.V

Academic Evaluation and Monitoring Cell

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A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	CS

Semester:	6	Academic Year:	2019-20
Course Title:	COMPUTER GRAPHICS & VISUALIZATION	Course Code:	17CS62
Credit / L-T-P:	4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	80 marks
CIA Marks:	20	Assignment	1 / Module
Course Plan Author:	Priyanka H .V	Sign ..	
Checked By:		Sign ..	
CO Targets	CIA Target :	SEE Target:	

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute.

Module	Content	Teaching Hours
1	Overview: Computer Graphics : Basics of computer graphics, Application of Computer Graphics, Video Display Devices, Random Scan and Raster Scan displays, color CRT monitors, Flat panel displays. Raster-scan systems: video controller, raster scan Display processor, graphics workstations and viewing systems, Input devices, graphics networks, graphics on the internet, graphics software. Introduction to Open GL :Coordinate reference frames, specifying two-dimensional world coordinate reference frames in Open GL, Opening point functions, Open GL line functions, point attributes, line attributes, curve attributes, Open GL point attribute functions, Open GL line attribute functions, Line drawing algorithms(DDA , Bresenham's), circle generation algorithms (Bresenham's)	10 (5, 5)
2	Fill area Primitives: Polygon fill-areas, Open GL polygon fill area functions, fill area attributes, general scan line polygon fill algorithm, Open GL fill-area attribute functions Basic 2D Geometric Transformation Matrix representations and homogeneous coordinates. Inverse transformations, 2DComposite transformations, other 2D transformations, raster methods for geometric transformations, Open GL raster transformations, Open GL geometric transformations function, 2D viewing: 2D viewing pipeline, Open GL 2D viewing functions.	10 (5, 5)
3	Clipping window, normalization and view port transformations: clipping algorithms,2D point clipping, 2D line clipping algorithms: Cohen-Sutherland line clipping only -polygon fill area clipping: Sutherland-Hodge man polygon clipping algorithm only.3DGeometric Transformations: 3D translation, rotation, scaling, composite 3D transformations, other 3D transformations, affine transformations, open GL geometric transformations functions. Color Models: Properties of light, RGB and CMY color models. Illumination Models: Light sources, basic illumination models-Ambient light, diffuse reflection, specular and phong model, Corresponding open GL functions.	10 (5, 5)
4	3D viewing:3D viewing concepts, 3D viewing pipeline, 3D viewing coordinate parameters, Transformation from world to transformation viewing coordinates, Projection transformation, orthogonal projections. The view port transformation and 3D screen coordinates. Open GL 3D viewing functions: Visible Surface Detection Methods: Classification of visible surface Detection algorithms, back face detection, depth buffer method and Open GL visibility detection functions.	10 (5, 5)
5	Input & interaction Input and Interaction: Input devices, clients and servers, Display Lists, Display Lists and Modeling, Programming Event Driven Input, Menus Picking, Building Interactive Models, Animating Interactive programs. Curves and Computer Animation Design of Interactive programs, Logic operations .Curved surfaces, quadratic surfaces, Open GL Quadratic Surface and Cubic-Surface Functions, Bezier Spline Curves, Bezier surfaces, Design of Interactive programs. Corresponding openGL functions.	10 (5, 5)
-	**Total**	**50**

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).
1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1, 2, 3, 4, 5	Computer Graphics with Open GL, Donald Hearn & Pauline Baker, Version 3 rd / 4 th Edition, Pearson Education,2011	1,2,3,4,5,6,7,8,9,13	In Lib / In Dept
5	Interactive Computer Graphics- A Top Down approach with Open GL, Edward Angel, 5 th edition. Pearson Education, 2008	3	In Lib/ In dept
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1, 2	Computer Architecture: A quantitative approach, John L. Hennessy and David A. Patterson,5th edition, Morgan Kaufmann Elseveir, 2013	3	In Lib
3,4	Computer Graphics , sham's outline series, Xiang, Plastock,2nd edition, TMG	5	In Lib
5	Interactive Computer Graphics, concepts Kelvin Sung, Peter Shirley, steven Baer, and applications, Cengage Learning	5	In Lib
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
C1	https://www.youtube.=com/watch? vFvud81pYGOg		
C2	https://www.youtube.com/watch? v=TsBTI3tO5		
D	**Software Tools for Design**	**-**	**-**
	Open GL tool		
E	**Recent Developments for Research**	**-**	**-**
	Improve efficiency in Open GL		
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1	www.tutorialpoint.com		
2	Www.javatpoint.com		

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
1	17cpl26	Computer Programming	Knowledge on C & C ++	2	Videos of C++	L3
2	17cs34	Computer Architecture	Knowledge of Computer Architecture	4	Different types of Computer Architecture	L2

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	Graphics illuminations	Higher Study	Gap A seminar on Open GL Functions	Understand L2

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Instr Method	Assessment Method	Blooms' Level
1	17CS62.1	Understand the Computer graphics and imaging systems With Open GL API functions	5	Lecture	Slip Test	L2
2	17CS62..2	Implement various Graphic primitives for 2D Geometrical Transformations .	5	Case Studies	analyze compare	L3
3	17CS62.3	Interpret different clipping algorithms ,Color and Illumination Models.	5	Discussion	differentiate examine	L3
4	17CS62.4	Examine Opengl visibility detection functions in 3D viewing Transformation.	5	Lecture	Slip Test	L4
5	17CS62.5	Analyze various Input Interactive Animation functions and realistic effects on the graphics objects	5	Small group discussions	integrate predict	L4
-	**-**	**Total**	**50**	**-**	**-**	**L2-L4**

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	Computer Aided Design	CO1	L2
2	Virtual Reality Environment	CO2	L3
3	Education And Training	CO3	L3
4	Entertainment	CO4	L4
5	Image processing	CO5	L4

3. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes														-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Level
1	CO1	Understand the Computer graphics and imaging systems With Open GL API functions	2	2	2	2	2	1	-	-	-	-	2	2	1	2	2	L2
2	CO2	Implement various Graphic primitives for 2D Geometrical Transformations .	2	2	2	2	2	1	-	-	-	-	2	2	1	2	2	L3
3	CO3	Interpret different clipping algorithms ,Color and Illumination Models.	2	2	2	2	2	1	-	-	-	-	2	2	1	2	2	L3
4	CO4	Examine Opengl visibility detection functions in 3D viewing Transformation.	2	2	2	2	2	1	-	-	-	-	2	2	1	2	2	L4
5	CO5	Analyze various Input Interactive Animation functions and realistic effects on the graphics objects	2	2	2	2	2	1	-	-	-	-	2	2	1	2	2	L4
-	**17CS62.**	Average																**-**

-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*

4. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Modules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1	Graphics illuminations	Seminar	12/3/2019	Rashmi .p	List from B4 above

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation.

Modules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Overview of Computer Graphics	5	2	-	-	1	1	2	CO1	L2
2	2DGeometric Transformations and 2D viewing	5	2	2	-	-	-	-	CO2	L3
3	clipping window, normalization	5	-	2	-	-	-	-	CO3	L3
4	3Dviewing coordinate parameters	5	-	2	-	1	1	2	CO4	L4
5	Curves and Computer Animation:	5	-	-	2	1	1	2	CO5	L4
-	**Total**	**50**	**4**	**4**	**4**	**5**	**5**	**10**		

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Modules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam – 1	15	CO1, CO2, CO3,Co4	L2,L4,L3,L2
3, 4	CIA Exam – 2	15	CO5, CO6, CO7, C08	L2,L3,L3,L4
5	CIA Exam – 3	15	CO9, CO10	L2,L2
1, 2	Assignment - 1	05	CO1, CO2, CO3,Co4	L2,L4,L3,L2
3, 4	Assignment - 2	05	CO5, CO6, CO7, C08	L2,L3,L3,L4
5	Assignment - 3	05	CO9, CO10	L2,L2
1, 2	Seminar - 1		-	-
3, 4	Seminar - 2		-	-
5	Seminar - 3		-	-
1, 2	Quiz - 1		-	-
3, 4	Quiz - 2		-	-
5	Quiz - 3		-	-
1 - 5	Other Activities – Mini Project	-	CO9, CO10	L3,L4
	Final CIA Marks	**20**	**-**	**-**

D1. TEACHING PLAN - 1

Module - 1

Title:		Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**

1	Understand the Computer graphics and imaging systems With Open GL API functions	CO1	L2
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	-
1	Overview: Computer Graphics and OpenGL**:** Computer Graphics:Basics of computer graphics	CO1	L2
2	Application of Computer Graphics	CO1	L2
3	Video Display Devices: Random Scan and Raster Scan displays	CO1	L2
4	color CRT monitors	CO1	L2
5	Flat panel displays	CO1	L2
6	Raster-scan systems	CO1	L2
7	video controller	CO1	L2
8	Raster scan Display processor, graphics workstations and viewing systems	CO1	L2
9	Input devices, graphics networks	CO1	L2
10	graphics on the internet, graphics software	CO1	L2
11	OpenGL: Introduction to OpenGL ,coordinate reference frames	CO1	L2
12	Specifying two-dimensional world coordinate reference frames in OpenGL	CO1	L2
13	OpenGL point functions, OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL point attribute functions	CO1	L2
14	OpenGL line attribute functions, Line drawing algorithms(DDA, Bresenham's), circle generation algorithms (Bresenham's).	CO1	L2
c	**Application Areas**		
-	Students should be able employ / apply the Module learnings to . . .		
1	Understanding of graphics and imaging systems.	CO1	L2
d	**Review Questions**		
-			
1	Define Computer Graphics	CO1	L2
2	Define persistence, resolution and aspect ratio	CO1	L2
4	What is a raster scan system	CO1	L2
5	What is a random scan system	CO1	L2
6	Digitize a line from (10,12) to (15,15) on a raster screen using Bresenham's straight line algorithm	CO1	L2
7	What do you mean by emissive and non-emissive displays	CO1	L2
8	What do you mean by scan conversion	CO1	L2

Module – 2

Title:		Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-		-	**Level**
	implement various Graphic primitives for 2D Geometrical Transformations .	CO2	L3
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Explain different Graphic primitives	CO2	L3
2	To implement various Geometrical Transformations	CO2	L3
13	Fill area Primitives, 2D Geometric Transformations and 2D viewing:	CO2	L3
14	Fill area Primitives: Polygon fill-areas	CO2	L3
15	OpenGL polygon fill area functions, fill area attributes	CO2	L3
16	General scan line polygon fill algorithm	CO2	L3
17	OpenGL fill-area attribute functions.	CO2	L3
18	2DGeometric Transformations: Basic 2D Geometric Transformations	CO2	L3
19	Matrix representations and homogeneous coordinates	CO2	L3

18	Inverse transformations, 2DComposite transformations	CO2	L3
19	other 2D transformations, raster methods for geometric transformations	CO2	L3
20	OpenGL raster transformations	CO2	L3
21	OpenGL geometric transformations function, 2D viewing:	CO2	L3
22	2D viewing pipeline, OpenGL 2D viewing functions.	CO2	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	Develop applications in OpenGL	CO2	L3
d	**Review Questions**	-	-
-		CO2	L3
1	What is Transformation	CO2	L3
2	What is shearing	CO2	L3
3	What is reflection	CO2	L3
4	Distinguish between window port & view port.	CO2	L3
5	Define clipping	CO2	L3
6	What is the need of homogeneous coordinates	CO2	L3
7	What is fixed point scaling	CO2	L3
8	Define Affine transformation	CO2	L3

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17CS62	Sem:	6	Marks:	30	Time:	
Course:	Computer graphics and Visualization						

-	-	**Note: Answer all questions, each carry equal marks. Module : 1, 2**	**Marks**	**CO**	**Level**
1	a	Explain refresh cathode ray tube.	5	CO1	L2
	b	Explain color CRT monitors.	5	CO1	L2
	c	Explain direct view storage tubes and liquid crystal displays.	5	CO1	L2
2	a	Explain reflection and shear?	5	CO1	L2
	b	Explain 2D Transportation with Example?	5	CO1	L2
	c	Explain Briefly with Polygon Classification?	5	CO1	L2
3	a	Describe in detail about the DDA scan conversion algorithm	5	CO2	L3
	b	Explain in detail about raster and random scan systems.	5	CO2	L3
	c	Explain in detail about Bresenham's line generating algorithm. Give example	5	CO2	L3
4	a	Write a detailed note on the basic two dimensional transformations.	5	CO2	L3
	b	Compare Cohen-Sutherland line clipping algorithm and Liang-Barsky line clipping algorithm	5	CO2	L3
	c	Explain in detail about window to viewport coordinate transformation.	5	CO2	L3

b. Assignment -1

Model Assignment Questions							
Crs Code:	17CS62	Sem:	6	Marks:	10	Time:	
Course:	Computer graphics and visualization						

SNo	**Assignment Description**	**Marks**	**CO**	**Level**
1	Define Computer Graphics? Explain the Application of Computer Graphics	8	CO1	L2
2	Explain Briefly the Cathode Ray Tube?	8	CO1	L2
3	Explain Random Scan and the Raster Scan	8	CO1	L2
4	Differentiate between Raster scan and the random scan	6	CO1	L2
5	Explain Color CRT Monitor	6	CO1	L2

6	Explain input Devices in Detail	9	CO1	L2
7	Explain DDA Algorithm	9	CO1	L2
8	Explain Bresenhems line drawing Algorithm	9	CO1	L2
9	Explain Midpoint circle Algorithm	6	CO1	L2
10	Explain Polygon Classification? Explain how to identify concave Polygon?	6	CO2	L3
11	Explain vector Method for splitting Algorithm	8	CO2	L3
12	Explain General scan line Polygon Algorithm	9	CO2	L3
13	Explain 2D Transformation	9	CO2	L3
14	Explain Inverse Transformation	6	CO2	L3
15	Explain Inverse and shear transformation	6	CO2	L3

D2. TEACHING PLAN - 2

Module – 3

Title:		Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
	Interpret different clipping algorithms ,Color and Illumination Models.	CO3	L3
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	Clipping,3D Geometric Transformations, Color and Illumination Models: Clipping	CO3	L3
2	clipping window, normalization and viewport transformations	CO3	L3
3	clipping algorithms,2D point clipping	CO3	L3
4	2D line clipping algorithms: cohen-sutherland line clipping only -polygon fill area clipping	CO3	L3
5	Sutherland -Hodgeman polygon clipping algorithm only.3DGeometric Transformations: 3D translation	CO3	L3
6	Rotation, scaling, composite 3D transformations	CO3	L3
7	Other 3D transformations, affine transformations	CO3	L3
8	OpenGL geometric transformations functions.	CO3	L3
9	Color Models: Properties of light	CO3	L3
10	color models, RGB and CMY color models		
11	Illumination Models: Light sources		
c	**Applications Areas**	**-**	**-**
1	Develop graphics application programs using the various syntax and forms of OpenGL	CO3	L3
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	What are the various representation schemes used in three dimensional objects?	CO3	L3
2	What is Polygon mesh?	CO3	L3
3	Explain Back face detection method and Depth buffer method	CO3	L3
4	Briefly explain about the basic transformations performed on three dimensional objects.	CO3	L3
5	Explain in detail about 3D window to viewport coordinate transformation.	CO3	L3
6	Explain area subdivision and A- Buffer method	CO3	L3
7	Define Projection.	CO3	L3
8	Explain in detail about the boundary representation of three dimensional objects.	CO3	L3
9	Explain in detail about 3D window to viewport coordinate transformation.	CO3	L3
10	Define B-Spline curve.	CO3	L3
11	What are the different ways of specifying spline curve?	CO3	L3

Module – 4

Title:	Data Transmission and Telemetry Measurement of Non – Electrical Quantities	Appr Time:	10 Hrs

a	*Course Outcomes*	CO	Blooms
-	At the end of the topic the student should be able to . . .	-	**Level**
	Examine Opengl visibility detection functions in 3D viewing Transformation.	CO4	L4
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	3D Viewing and Visible Surface Detection: 3DViewing :3D viewing concepts	CO4	L4
2	3D viewing pipeline, 3D viewing coordinate parameters	CO4	L4
3	Transformation from world to viewing coordinates	CO4	L4
4	Projection transformation, orthogonal projections	CO4	L4
5	Perspective projections, The viewport transformation and 3D screen coordinates	CO4	L4
6	OpenGL 3D viewing functions	CO4	L4
7	Visible Surface Detection Methods	CO4	L4
8	Classification of visible surface Detection algorithms	CO4	L4
9	Back face detection	CO4	L4
10	Depth buffer method and OpenGL visibility detection functions.	CO4	L4
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	Develop OpenGL programs by applying animation to the graphics object	CO4	L4
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	What are subtractive colors?	CO4	L4
2	What do you mean by shading of objects?	CO4	L4
3	What are the types of reflection of incident light?	CO4	L4
4	Differentiate flat and smooth shading	CO4	L4
5	Define complementary colors.	CO4	L4
6	Explain in detail about the conversion between HSV and RGB color models.	CO4	L4
7	Explain transformation from world to viewing coordinates	CO4	L4
8	Define intensity of light.	CO4	L4
9	Explain in detail about RGB color model.	CO4	L4
10	State the use of chromatically diagram.	CO4	L4
11	What are the two common sources of textures	CO4	L4
12	Define rendering	CO4	L4
13	Explain in detail about shading models.	CO4	L4
14	Explain in detail about CMY color model.	CO4	L4

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17cs62	Sem:	6	Marks:	30	Time	
Course:	Computer graphics and Visulization						

-	-	**Note: Answer all questions, each carry equal marks. Module : 3, 4**	**Marks**	**CO**	**Level**
1	a	Write short notes on co-ordinate systems and frames.	4	CO3	L3
	b	Explain in details affine transformation	5	CO3	L3
	c	Explain scaling rotation and translation with example	4	CO3	L3
	d	Explain different types of input devices	3	CO3	L3
2	a	Write an OpenGL program to implement Menu driven event handling using programming.	4	CO3	L3
	b	Write short notes on co-ordinate systems and frames.	5	CO3	L3
	c	What is a shadow?	4	CO3	L3
	d	What is purity of light?	3	CO3	L3
3	a	Compare and contrast RGB and CMY.	4	CO4	L4
	b	Explain Gouraud shading and Phong shading.	5	CO4	L4
	c	Explain in detail about the three dimensional transformations.	4	CO4	L4
	d	Explain in detail about 3D window to viewport coordinate transformation.	3	CO4	L4

4	a	Define Projection.	4	CO4	L4
	b	What is view-plane normal vector?	5	CO4	L4
	c	Write short notes on parallel and perspective projections.	4	CO4	L4
	d	Explain Back face detection method and Depth buffer method	3	CO4	L4

b. Assignment – 2

Model Assignment Questions							
Crs Code:	17CS62	Sem:	6	Marks:	10	Time:	
Course:	Computer Graphics and Visualization						

SNo	Assignment Description	Marks	CO	Level
1	What are the various representation schemes used in three dimensional objects?	8	CO3	L3
2	What is Polygon mesh?	6	CO3	L3
3	Explain Back face detection method and Depth buffer method	8	CO3	L3
4	Briefly explain about the basic transformations performed on three dimensional objects.	6	CO3	L3
5	Explain in detail about 3D window to viewport coordinate transformation.	8	CO3	L3
6	Explain area subdivision and A- Buffer method	6	CO3	L3
7	Define Projection.	8	CO3	L3
8	Explain in detail about the boundary representation of three dimensional objects.	6	CO3	L3
9	What are subtractive colors?	8	CO3	L3
10	What do you mean by shading of objects?	6	CO3	L3
11	What are the types of reflection of incident light?	8	CO3	L3
12	Differentiate flat and smooth shading	6	CO3	L3
13	Define complementary colors.	8	CO3	L3
14	Explain in detail about the conversion between HSV and RGB color models.	6	CO3	L3
15	Explain transformation from world to viewing coordinates	8	CO3	L3
16	Define intensity of light.	8	CO3	L3
17	Explain in detail about RGB color model.	6	CO3	L3
18	State the use of chromatically diagram.	8	CO3	L3
19	What are the two common sources of textures	6	CO3	L3
20	Define rendering	8	CO3	L3

D3. TEACHING PLAN - 3

Module – 5

Title:	Loop and Horn Antenna and Antenna Types	Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
	Analyze various Input Interactive Animation functions and realistic effects on the graphics objects	CO5	L4
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Input& interaction, Curves and Computer Animation: Input and Interaction	CO5	L4
2	Input devices, clients and servers	CO5	L4
3	Display Lists, Display Lists and Modelling	CO5	L4
4	Programming Event Driven Input	CO5	L4
5	Menus Picking	CO5	L4
6	Building Interactive Models	CO5	L4

7	Animating Interactive programs	CO5	L4
8	Design of Interactive programs, Logic operations	CO5	L4
9	Curved surfaces, quadric surfaces	CO5	L4
10	OpenGL Quadric-Surface and Cubic-Surface Functions	CO5	L4
11	Bezier Spline Curves	CO5	L4
12	Bezier surfaces	CO5	L4
13	OpenGL curve functions.	CO5	L4
14	Corresponding openGL functions	CO5	L4
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	Develop OpenGL programs with realistic effects on the graphics objects.	CO5	L4
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Define Input and Interaction	CO5	L4
2	Explain input devices	CO5	L4
3	What is Bezier Spline Curves & explain	CO5	L4
4	Explain Quadric-Surface and Cubic-Surface Functions	CO5	L4
5	Define computer graphics animation.	CO5	L4
6	Explain about reflections and transparency.	CO5	L4
7	Explain phong lighting model .Indicate the advantages and disadvantages	CO5	L4
8	What are different classical perspective views?	CO5	L4
9	Explain the function used for parallel viewing in open GL	CO5	L4
10	Compare COP and DOP.	CO5	L4
11	Differentiate between window port and view port	CO5	L4

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code	17CS62	Sem:	6	Marks:	30	Time:	
Course:	Computer Graphics and Visualization						

-	-	**Note: Answer all questions, each carry equal marks. Module : 5**	**Marks**	**CO**	**Level**
1	a	Illustrate how an interactive program is animated	5	CO5	L4
	b	What are quadratic surfaces? List and explain OpenGL Quadratic Surface and Cubic-Surface Functions	5	CO5	L4
	c	With necessary codes, explain Bezier Spline Curves	5	CO5	L4
2	a	Represent simple graphics & display processor architectures. Explain the 2 ways of sending graphical entities to a display and list advantages and disadvantages	5	CO5	L4
	b	Discuss the following logic operations with suitable example. (i) copy mode (ii) Exclusive OR mode (iii) rubber-band effect (iv) drawing erasable lines	5	CO5	L4
	c	Write a note on design techniques for Bezier curves	5	CO5	L4
3	a	What is Bezier Spline Curves & explain	5	CO5	L4
	b	Explain Quadric-Surface and Cubic-Surface Functions	5	CO5	L4
	c	Define computer graphics animation.	5	CO5	L4
4	a	Explain the function used for parallel viewing in open GL	5	CO5	L4
	b	Compare COP and DOP.	5	CO5	L4
	c	Differentiate between window port and view port	5	CO5	L4

b. Assignment – 3

Model Assignment Questions							
Crs Code:	17Cs62	Sem:	6	Marks:	10	Time:	
Course:	Computer graphics and Visualization						

SNo	Assignment Description	Marks	CO	Level
1	Define Input and Interaction	8	CO5	L4
2	Explain input devices	6	CO5	L4
3	What is Bezier Spline Curves & explain	8	CO5	L4
4	Explain Quadric-Surface and Cubic-Surface Functions	6	CO5	L4
5	Define computer graphics animation.	8	CO5	L4
6	Explain about reflections and transparency.	6	CO5	L4
7	Explain phong lighting model .Indicate the advantages and disadvantages	8	CO5	L4
8	What are different classical perspective views?	6	CO5	L4
9	Explain the function used for parallel viewing in open GL	8	CO5	L4
10	Compare COP and DOP.	6	CO5	L4
11	Differentiate between window port and view port	8	CO5	L4

F. EXAM PREPARATION

1. University Model Question Paper

Course:		Computer Graphics and Visualization						Month / Year		
Crs Code:		17cs62	Sem:	6	Marks:	80		Time:	180 minutes	
Module		Answer all FIVE full questions. All questions carry equal marks.						**Marks**	**CO**	**Level**
1	a	. Enlist the applications of computer graphics and explain						6	CO1	L2
	b	Differentiate between raster scan displays and random scan displays						6	CO1	L2
	c	Write a note on midpoint circle algorithm						4	CO1	L2
2	a	Discuss about the video controller and raster scan display processor						6	CO1	L2
	b	Explain the concept of Bresenham's line drawing algorithm						6	CO1	L2
	c	What are OpenGL line and point functions? Illustrate about the line and point attribute functions.						4	CO1	L2
3	a	What are the polygon classifications? How to identify a convex polygon? Illustrate how to split a concave polygon						6	CO2	L3
	b	Discuss the steps involved in inside outside tests for a polygon filing						6	CO2	L3
	c	List and explain polygon fill area functions and fill area primitives						4	CO2	L3
4	a	Explain the concept of general scan line polygon fill algorithm						6	CO2	L3
	b	What is a stitching effect? How does OpenGL deals with it						6	CO2	L3
	c	Write a note on 2D rotation, scaling, and translation. Also Discuss the same using a pivot/fixed point.						4	CO2	L3
5	a	Write the formulae used in mapping clipping window into a normalized viewport. Use the same and explain the concept of mapping the clipping window into a normalized square and then to screen viewport.						6	CO3	L3
	b	Consider an example and apply Cohen-Sutherland line clipping algorithm. Explain the steps						6	CO3	L3
	c	Explain Sutherland-Hodgeman polygon clipping with an example.						4	CO3	L3
6	a	Explain Sutherland-Hodgeman polygon clipping with an example.						6	CO3	L3
	b	Explain the 3D reflection and shearing						6	CO3	L3
	c	Illustrate about RGB and CMY color models. Write a note on light sources.						4	CO3	L3
7	a	Describe a 3D viewing pipeline with necessary diagrams						6	CO4	L3
	b	Write a note on parallel and perspective projections. Also explain orthogonal projections in detail						6	CO4	L3
	c	What are vanishing points for perspective projections?						4	CO4	L3
8	a	Describe perspective projections with necessary diagrams						6	CO4	L3

	b	Write a note on oblique and symmetric perspective projection frustum	6	CO4	L3
	c	List and explain OpenGL 3D viewing functions	4	CO4	L3
9	a	Illustrate how an interactive program is animated	6	CO5	L4
	b	What are quadratic surfaces? List and explain OpenGL Quadratic Surface and Cubic-Surface Functions	6	CO5	L4
	c	With necessary codes, explain Bezier Spline Curves	4	CO5	L4
10	a	Represent simple graphics & display processor architectures. Explain the 2 ways of sending graphical entities to a display and list advantages and disadvantages	6	CO5	L4
	b	Discuss the following logic operations with suitable example. (i) copy mode (ii) Exclusive OR mode (iii) rubber-band effect (iv) drawing erasable lines	6	CO5	L4
	c	Write a note on design techniques for Bezier curves	4	CO5	L4

2. SEE Important Questions

Course:		Computer Graphics and Visualization					Month / Year		
Crs Code:		17cs62	Sem:	6	Marks:	80	Time:		
	Note	Answer all FIVE full questions. All questions carry equal marks.					-	-	
Module	Qno.	Important Question					**Marks**	**CO**	**Year**
1	a	. Enlist the applications of computer graphics and explain					6	CO1	
	b	Differentiate between raster scan displays and random scan displays					6	CO1	
	c	Write a note on midpoint circle algorithm					4	CO1	
2	a	Discuss about the video controller and raster scan display processor					6	CO1	
	b	Explain the concept of Bresenham's line drawing algorithm					6	CO1	
	c	What are OpenGL line and point functions? Illustrate about the line and point attribute functions.					4	CO1	
3	a	What are the polygon classifications? How to identify a convex polygon? Illustrate how to split a concave polygon					6	CO2	
	b	Discuss the steps involved in inside outside tests for a polygon filing					6	CO2	
	c	List and explain polygon fill area functions and fill area primitives					4	CO2	
4	a	Explain the concept of general scan line polygon fill algorithm					6	CO2	
	b	What is a stitching effect? How does OpenGL deals with it					6	CO2	
	c	Write a note on 2D rotation, scaling, and translation. Also Discuss the same using a pivot/fixed point.					4	CO2	
5	a	Write the formulae used in mapping clipping window into a normalized viewport. Use the same and explain the concept of mapping the clipping window into a normalized square and then to screen viewport.					6	CO3	
	b	Consider an example and apply Cohen-Sutherland line clipping algorithm. Explain the steps					6	CO3	
	c	Explain Sutherland-Hodgeman polygon clipping with an example.					4	CO3	
6	a	Explain Sutherland-Hodgeman polygon clipping with an example.					6	CO3	
	b	Explain the 3D reflection and shearing					6	CO3	
	c	Illustrate about RGB and CMY color models. Write a note on light sources.					4	CO3	
7	a	Describe a 3D viewing pipeline with necessary diagrams					6	CO4	
	b	Write a note on parallel and perspective projections. Also explain orthogonal projections in detail					6	CO4	
	c	What are vanishing points for perspective projections?					4	CO4	
8	a	Describe perspective projections with necessary diagrams					6	CO4	
	b	Write a note on oblique and symmetric perspective projection frustum					6	CO4	
	c	List and explain OpenGL 3D viewing functions					4	CO4	
9	a	Illustrate how an interactive program is animated					6	CO5	
	b	What are quadratic surfaces? List and explain OpenGL Quadratic Surface and Cubic-Surface Functions					6	CO5	
	c	With necessary codes, explain Bezier Spline Curves					4	CO5	

10	a	Represent simple graphics & display processor architectures. Explain the 2 ways of sending graphical entities to a display and list advantages and disadvantages	6	CO5	
	b	Discuss the following logic operations with suitable example. (i) copy mode (ii) Exclusive OR mode (iii) rubber-band effect (iv) drawing erasable lines	6	CO5	
	c	Write a note on design techniques for Bezier curves	4	CO5	