



## COMPUTER GRAPHICS [CS521PE] COURSE PLANNER

### I. COURSE PURPOSE:-

After the completion of course, the student should be in a position to apply his /her knowledge in

- 1) Geometrical Transformations in 2-Dimensional and 3-Dimensional perspectives
- 2) Object representations
- 3) Surface detection procedures
- 4) Computer Animations

### II. PREREQUISITE:-

1. Mathematics – Linear algebra is recommended.
2. Good programming skills in C
3. This class we will teach algorithms, not programming in C.
4. Familiarity with the theory and use of coordinate geometry and of linear algebra, such as matrix multiplication.
5. A course on “Computer Programming and Data Structures”

### III. COURSE OBJECTIVES:-

1	This Course provides an introduction to the principles of computer graphics. In particular, the course will consider methods for modeling 2-D objects and how it generates photorealistic renderings on color raster graphics devices. The emphasis of the course will be placed on understanding how the various elements that like algebra, geometry, algorithms and data structures interact in the design of graphics
2	This course provides an idea on hardware system architecture for computer graphics. This includes, but it is not limited to: graphics pipeline, frame buffers, and graphic co – processors.
3	To give idea about basic building blocks of multimedia and a study about how these blocks together with the current technology and tools

### IV. COURSE OUTCOMES:-

S.No	Description	Bloom's Taxonomy Level
1	Students will be able to <b>describe</b> the fundamental algorithms used in computer graphics and to some extent be able to <b>compare</b> and evaluate them	<b>Knowledge, Understand</b> (Level1, Level2)
2	Students will be able to work and interact, through hands-on experiences, to design, develop, and modify electronically generated imagery using a wide range of sophisticated graphical tools and techniques.	<b>Apply, Create</b> (Level 3)
3	Students will be able to <b>summarize</b> different hidden surface elimination algorithms and shading techniques used in computer graphics and digital media production.	<b>Evaluate</b> (Level 3)

4	Students will be able to <b>explain</b> about the technology necessary for creating multimedia content for the web, video, DVD, 2D and 3D graphics, Sound and programming.	<b>Analyze (Level 3)</b>
5	Students can <b>apply</b> the knowledge, techniques, skills and modern tools to become successful professionals in communication and media industries	<b>Apply (Level 3)</b> -

## **V.COURSE CONTENT:-**

### **UNIT - I Introduction:**

Application areas of Computer Graphics, overview of graphics systems, Video -display devices, Raster - scan systems, random scan systems, graphics monitors and work stations and input devices Output primitives: Points and lines, line drawing algorithms, mid - point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary - fill and flood - fill algorithms.

### **UNIT – II 2 - D Geometrical transforms:**

Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms transformations between coordinate systems.

**2-D Viewing:** The viewing pipeline, viewing coordinate reference frame, window to view - port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

### **UNIT –III 3-D Object representation:**

Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces, Basic Illumination models,polygon rendering methods

### **UNIT –IV**

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

**3-D viewing:** Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

### **UNIT - V Computer animation:**

Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

**Visible surface detection methods:**

Classification, back - face detection, depth - buffer, scan - line, depth sorting, BSP - tree methods, area sub- division and octree methods Illumination Models and Surface rendering Methods: Basic illumination models, polygon rendering methods

**TEXT BOOKS:**

- 1.“Computer Graphics C version”, Donald Hearn and M. Pauline Baker, Pearson education.
- 2.“Computer Graphics Second edition”, Zhigand xiang, Roy Plastock, Schaum’s outlines, Tata Mc Graw hill edition.

**REFERENCE BOOKS:**

- 1.“Computer Graphics Principles & practice”, second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
- 2.“Procedural elements for Computer Graphics”, David F Rogers, Tata Mc Graw hill, 2nd edition.
- 3.“Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
4. “Principles of Computer Graphics”, Shalini, Govil-Pai, Springer.
5. “Computer Graphics”, Steven Harrington, TMH
6. Computer Graphics, F. S. Hill, S. M. Kelley, PHI.
7. Computer Graphics, P. Shirley, Steve Marschner & Others, Cengage Learning.
8. Computer Graphics & Animation, M. C. Trivedi, Jaico Publishing House.
9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R.Goldman, CRC Press, Taylor&Francis Group.
10. Computer Graphics, Rajesh K.Maurya, Wiley India.
11. Computer Graphics, Atul P. Godse, Technical Publications

**NPTEL Web Course:**

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

**NPTEL Video Course:**

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

**UGC-NET Syllabus**

Display system , input device, 2D, geometry, Graphics operation, 3D Graphics, Animation Graphic Standard, Application concepts, Storage Devices, Input Tools, Authoring Tools, Application files

## VI.LESSON PLAN:-

S.No	Week	Topic	Topics to be covered	Link for PPT	Link for PDF	Link for Small Projects/ Numericals(if any)	Course learning outcomes	Teaching methodology	Reference
1	1	Introduction	Introduction to the Course,	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	T1
2		Application areas of Computer Graphics	Areas where Computer Graphics is used.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	
3		Overview of graphics systems, video-display devices	Detailed Explanation about CRT Mechanism	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	
4		Raster-scan systems	Explain in detail about the Random Scan Display System.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	
5		Random scan systems	Explain in detail about the Raster Scan Display System.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	
6		Graphics monitors and work stations	Problems on Raster Systems, refresh rate and aspect ratio	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	



				<a href="#">00PE?usp=sharing</a>	<a href="#">Vp5GoogU/v</a>			
7		Input devices	Explain in detail about the Graphics Monitors and Workstations.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Rem ember	Chalk & Talk
8		Output primitives: Points and lines	Gathering the Knowledge about the Input Devices, Gathering the Knowledge about how to create the Points and Lines	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Rem ember	Chalk & Talk
9		Line drawing algorithms - Bresenham's Algorithm	Working and Problem Solving on Line drawing Algorithms	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Rem ember	Chalk & Talk
1		Bresenham's Algorithm(Cont..)	Univ Papers Questions on Line drawing Alg's	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Rem ember	Chalk & Talk
1		Line drawing algorithms - DDA Algorithm	Working and Problem Solving on Line drawing Algorithms	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Rem ember	Chalk & Talk
1		Midpoint circle	Univ Papers Questions on Line drawing Alg's	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Rem ember	Chalk & Talk
1		Midpoint circle(Cont..)	Gathering the Knowledge about how Mid- Point	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=sharing</a>	Small Projects/	L1:Rem ember	Chalk & Talk
			Circle and Previous Univ Papers Solved Example	<a href="#">n5r2XOVtUi0vpSwy_YR_1W000PE?usp=sharing</a>	<a href="#">uLkwo3Cioa0Jwd1ICqAtVp5GoogU/v?usp=</a>	Numericals (if any) Link		

					<a href="#">sharing</a>				
1		Ellipse algorithms	Gathering the Knowledge about how Ellipse Drawing Algorithm and Previous Univ Papers Solved Example	<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L1:Remember	Chalk & Talk	
1		Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms	Explain about the Polygon and area filling in Raster Systems. Types of Seed Fill Algorithm.	<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
1		2-D geometrical transforms: Translation	Explain the Basic 2-D Transformation with derivation	<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
1		Scaling, Rotation	Explain the New co-ordinate w.r.t 2D	<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
1	2	Reflection and shear transformations	Explaining the Combination of 2D Transforms	<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
1		Matrix representations and homogeneous coordinates	Explaining the representation of Homogenous System	<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
2		Composite		<a href="https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12ClDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small	L2:Un	Chal	

T1





0		transforms	Explain the combination of Transforms and converting to new co-ordinate systems	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Projects/ Numericals (if any) Link	Understand	Chalk & Talk	
2		Transformations between coordinate systems	Explain the Transformation and Viewing System.	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L2: Understand	Chalk & Talk	
2		2-D viewing: The viewing pipeline, viewing coordinate reference frame	Explain the Viewing co-ordinates and viewing system	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L2: Understand	Chalk & Talk	
2		Window to view-port coordinate transformation, Viewing functions	Explain about Point Clipping, Line Clipping.	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L2: Understand	Chalk & Talk	
2		Cohen-Sutherland algorithms	Explain about Line Clipping Alg and University Solved Eg	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L2: Understand	Chalk & Talk	
2		Sutherland – Hodgeman polygon clipping algorithm	Explaining the Line Clipping Algorithm with derivation and Eg. Gathering the Knowledge about Sutherland - Hodgeman Polygon Clipping	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L2: Understand	Chalk & Talk	
2	3	3-D object	Explain the concepts	<a href="https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIdPn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3CioaQJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small	L2: Understand	Chalk & Talk	



		representation: Polygon surfaces, quadric surfaces, spline representation	about the Representation.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Projects/ Numericals(if any) Link	Understand	Talk	
2		Hermite curve, Bezier and B-Spline surfaces		<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
2		Bezier curve and B-Spline curves	Explain the types of representing the 3D Objects.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	T1
2		Polygon rendering methods, Basic illumination models	Explain the models of highlighting the models.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
3		Revision				Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
3	4	3-D Geometric transformations: Translation, rotation	Discussing the various 3-D Basic Transformations	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	T1
3		Scaling, reflection and shear transformations	Derive the Types of 3D Transformations	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
3		Composite transformations.	Explaining different combination of Transformations	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	





				<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">Swy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">oJwd1ICqAtVp5GoogU/view?usp=sharing</a>	Link			
3		3-D viewing: Viewing pipeline	Introduction to the concept of Viewing and explanation on Pipeline	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
3		Viewing coordinates, view volume	Explain the concept of Viewing coordinates systems and derivation	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
3		General projection transforms	Explanation of Projection Transforms and the concept of Clipping.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
3		Clipping	Transforms and the concept of Clipping	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
4		Computer animation: Design of animation sequence	Introduction to the concept of Computer Animation and steps involved	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L2:Understand	Chalk & Talk	
4	5	General computer animation functions	Understanding the concept of animation and the working principle of creating an Animation And explaining the Functions involved.	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L3:Analyze	Chalk & Talk	T1
4		Raster animation	Explaining the Involvement of Raster System to perform Animation	<a href="https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CIDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	L3:Analyze	Chalk & Talk	



				ing			
4	Computer animation languages	Introduction to the concept of Computer Animation and steps involved	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk
4	Key frame systems	Understanding the concept of animation and the working principle of creating an Animation. And explaining the Functions involved.	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk
4	Motion specifications	Explaining the Involvement of Raster System to perform Animation	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk
4	Visible surface detection methods: Classification	Explaining the Introduction to VSD and classifying the methods	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk
4	Back-face detection- Depth-buffer Method	Explaining in detail of the Types of Methods performed with Visible Surface Detection	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk
4	BSP-tree methods	Explain the method with derivation and Eg.	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk
4	Area sub-division method	Explain the method with derivation and Eg.	<a href="https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing">https://drive.google.com/drive/folders/12CiDpn5r2XOVtUi0vpSwy_YR_1WO00PE?usp=sharing</a>	<a href="https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing">https://drive.google.com/file/d/1Rf0-uLkwo3Cioa0Jwd1ICqAtVp5GoogU/view?usp=sharing</a>	Small Projects/ Numericals (if any) Link	L3: Analyze	Chalk & Talk



5	Revision				Small Projects/ Numericals(if any) Link	L3:Analyze	Chalk & Talk
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## VII.HOW PROGRAM OUTCOMES ARE ASSESSED:-

Program Outcomes (PO)		Level	Proficiency Assessed by
PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems related to Computer Science and Engineering.	3	Assignments
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems related to Computer Science and Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	Assignments
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems related to Computer Science and Engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Assignments
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	2	Assignments
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	--	--
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Computer Science and Engineering professional engineering practice.	1	Assignments
PO7	<b>Environment and sustainability:</b> Understand the impact of the Computer Science and Engineering professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	-	--
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	-	--
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	-	--

PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	-	--
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	-	--
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	2	Research

### VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED

Program Specific Outcomes (PSO)		Level	Proficiency Assessed by
PSO1	<b>Foundation of Mathematical Concepts:</b> To use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.	3	Lectures, Assignments
PSO2	<b>Foundation of Computer System:</b> The ability to interpret the fundamental concepts and methodology of computer systems. Students can understand the functionality of hardware and software aspects of computer systems.	2	Lectures, Assignments
PSO3	<b>Foundations of Software Development:</b> The ability to grasp the software development lifecycle and methodologies of software systems. Possess competent skills and knowledge of software design process. Familiarity and practical proficiency with a broad area of programming concepts and provide new ideas and innovations towards research.	--	--

### IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF

	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	2	-	1	-	3	-	-	-	-	-	-	-	2	-	-
CO4	2	2	-	2	-	1	-	-	-	-	-	-	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	1	-	-
AVG	1.4	1.2	0.6	0.4	0.6	0.2	-	-	-	-	-	-	1	0.4	-

## DESCRIPTIVE QUESTIONS

### UNIT-1

#### Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Explain</b> Raster and Random Scan Displays	Understand	2
2	<b>Explain</b> Briefly About flat panel displays	Knowledge	2
3	<b>Explain</b> Raster and Random Scan Systems	Understand	1
4	<b>Discuss</b> about Graphics Monitors and Workstations	Understand	2
5	<b>List</b> and Explain the Input Devices	Understand	1
6	<b>Describe</b> in CRT in details	Knowledge	2
7	<b>Explain</b> briefly about CRT Monitors	Understand	2
8	<b>Discuss</b> about three dimensional viewing devices	Analyze	2
9	<b>Explain</b> how CAD is used in computer graphics	Knowledge	5
10	<b>Explain</b> the following two applications of computer graphics (a) Presentation Graphics (b) Image Processing	Understand	5

#### Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Define</b> Computer Graphics	Knowledge	1
2	<b>List</b> the Application of Computer Graphics	Understand	2
3	<b>Define</b> Refreshing of Screen	Knowledge	1
4	<b>Define</b> Pixel	Knowledge	1
5	<b>Define</b> refresh Buffer	Knowledge	1
6	<b>List</b> out the merits and demerits of DVST	Understand	2
7	<b>Discuss</b> about LCD	Analysis	2
8	<b>Differentiate</b> Emissive and Non – Emissive Displays	Analysis	2
9	<b>List</b> out the merits and demerits of Plasma Panel Display	Understand	2
10	<b>Define</b> Persistence	Knowledge	1

### UNIT II

#### Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Discuss</b> about the general point pivot point and scaling	Understand	4
2	<b>Discuss</b> about composite transformations for translation, scaling, rotation	Apply	4
3	<b>Solve</b> the multiplication process of	Analyze	4



	transformation for each of the following sequence of operations is commutative (a) Two successive rotations		
4	<b>Discuss</b> 3D - Rotation	Knowledge	5
5	<b>Discuss</b> 3D - Scaling	Knowledge	5

#### Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Define</b> Transformation	Understanding	4
2	<b>Define</b> Translation	Understanding	4
3	<b>Define</b> Scaling	Understanding	4
4	<b>Define</b> Rotation	Understanding	4
5	<b>Define</b> Reflection	Understanding	4

### UNIT III

#### Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Solve</b> the following: For a Bezier surface patch given by control points[P] find the point on the surface at $u = v = 0.5$ [p] = (-3,0,3) (-3,1,1) (-3,1,-1) (-3,0,-3) (-1,1,3) (-1,1,1) (-1,1,-1) (-1,1,-3) (1,1,3) (1,1,1) (1,1,-1) (1,1,-3) (3,0,3) (3,1,1) (3,1,-1) (3,0,-3)	Apply	5
2	<b>Analyze</b> the procedure to calculate the parameters A,B,C,D using Cramers rule If the equation for plane surface is expressed in the form $Ax+By+Cz+D=0$	Apply	5
3	<b>List</b> and describe polygon table representation for two adjacent polygon surface formed with six edges and five vertices	Knowledge	5
4	<b>Discuss</b> about Bezier and B-Spline surfaces	Knowledge	5
5	<b>Discuss</b> about Hermite Curve generation	Understand	5

#### Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Define</b> Quadric surfaces	Understand	5
2	<b>Define</b> Spline	Understand	5
3	<b>Discuss</b> about polygon table	Analysis	5
4	<b>Discuss</b> about Phong Shading	Analysis	5
5	<b>Discuss</b> about Ellipsoid Surfaces	Analysis	5

### UNIT IV

#### Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
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1	<b>Explain</b> A – Buffer method	Apply	5
2	<b>Explain</b> depth sorting method	Knowledge	5
3	<b>Explain</b> the BSP tree method for visible surface detection	Knowledge	5
4	<b>Explain</b> Back face detection method	Knowledge	5
5	<b>Solve</b> the equation of a plane through the points (2,4,3), (4,4,5) and (8,9,3)	Knowledge	5

#### Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Define</b> visible surface detection methods	Understand	5
2	<b>Define</b> image space method	Understand	5
3	<b>Define</b> object space method	Understand	5
4	<b>Differentiate</b> image space method and object space method	Knowledge	5
5	<b>Discuss</b> about the followings: (a) depth field in A – buffer do (b) intensity field in A – buffer do	Knowledge Analysis	5

#### UNIT V

#### Long Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Discuss</b> the Advantages of real time animation over frame-by-frame animation	Understand	5
2	<b>Discuss</b> the drawbacks of real time animation techniques	Knowledge	5
3	<b>Describe</b> the various ways in which the motions of objects can be specified in an animation system	Understand	5
4	<b>Discuss</b> about raster animations	Understand	5
5	<b>Write</b> short notes on computer animation languages	Knowledge	5

#### Short Answer Questions-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	<b>Define</b> Computer Animation	Understand	2
2	<b>Discuss</b> about the steps in animation sequence	Understand	3
3	<b>Define</b> frame-by-frame animation works	Understand	4
4	<b>Define</b> Morphing	Understand	2
5	<b>Discuss</b> about the methods of motion specifications	Analysis	5

## OBJECTIVE QUESTIONS:

### UNIT I

1. Which devices provides positional information to the graphics system ?

- a) Input devices
- b) Output devices
- c) Pointing devices
- d) Both a and c

Answer : d

2. The number of pixels stored in the frame buffer of a graphics system is known as

- a) Resolution
- b) Depth
- c) Resolution
- d) Only a

Answer : d

3. The maximum number of points that can be displayed without overlap on a CRT is referred as

- a) Picture
- b) Resolution
- c) Persistence
- d) Neither b nor c

Answer : b

4. \_\_\_\_\_ stores the picture information as a charge distribution behind the phosphor-coated screen.

- a) Cathode ray tube
- b) Direct-view storage tube
- c) Flat panel displays
- d) 3D viewing device

Answer : b

5. The process of digitizing a given picture definition into a set of pixel-intensity for storage in the frame buffer is called

- a) Rasterization
- b) Encoding
- c) Scan conversion
- d) True color system

Answer : c

6. In LCD, the refresh rate of the screen is

- a) 60 frames/sec
- b) 80 frames/sec
- c) 30 frames/sec
- d) 100 frames/sec

Answer : a

7. Aspect ratio means

- a) Number of pixels
- b) Ratio of vertical points to horizontal points
- c) Ratio of horizontal points to vertical points
- d) Both b and c

Answer : d

8. The primary output device in a graphics system is \_\_\_\_\_

- a) Scanner
- b) Video monitor
- c) Neither a nor b
- d) Printer

Answer : b

9. Random-scan system mainly designed for

- a) Realistic shaded screen
- b) Fog effect
- c) Line-drawing applications
- d) Only b

Answer : c

10. \_\_\_\_\_ allows screen positions to be selected with the touch of a finger.

- a) Touch panels
- b) Image scanner
- c) Light pen
- d) Mouse

Answer : a

11. The device which is designed to minimize the background sound is

- a) Microphone
- b) Digitizers
- c) Data glove
- d) Joy stick

Answer : a

12. The quality of a picture obtained from a device depends on

- a) Dot size
- b) Number of dots per inch
- c) Number of lines per inch
- d) All of the mentioned

Answer : d

13. Which of the following device is not the input device?

- a) Trackball and space ball
- b) Data glove
- c) Only d
- d) Impact printers

Answer : c

14. Which device contains thumbwheel, trackball and a standard mouse ball?

- a) Z mouse
- b) Joystick
- c) Mouse
- d) Trackball

Answer : a

15. Virtual reality, CAD, and animations are the application of

- a) Z mouse
- b) Digitizers

- c) Data tablets
  - d) Image scanners
- Answer : a

## UNIT II

1. The matrix representation for translation in homogeneous coordinates is

- a)  $P' = T + P$
- b)  $P' = S * P$
- c)  $P' = R * P$
- d)  $P' = T * P$

Answer : d

2. What is the use of homogeneous coordinates and matrix representation?

- a) To treat all 3 transformations in a consistent way
- b) To scale
- c) To rotate
- d) To shear the object

Answer : a

3. If point are expressed in homogeneous coordinates then the pair of (x, y) is represented as

- a)  $(x', y', z')$
- b)  $(x, y, z)$
- c)  $(x', y', w)$
- d)  $(x', y', w)$

Answer : d

4. For 2D transformation the value of third coordinate i.e.  $w = ?$

- a) 1
- b) 0
- c) -1
- d) Any value

Answer : a

5. We can combine the multiplicative and translational terms for 2D into a single matrix representation by expanding

- a) 2 by 2 matrix into 4\*4 matrix
- b) 2 by 2 matrix into 3\*3
- c) 3 by 3 matrix into 2 by 2
- d) Only c

Answer : b

6. We translate a two-dimensional point by adding

- a) Translation distances
- b) Translation difference
- c) X and Y
- d) Only a

Answer : d

7. The basic geometric transformations are

- a) Translation
- b) Rotation
- c) Scaling

d) All of the mentioned

Answer : d

8. The original coordinates of the point in polar coordinates are

a)  $X'=r \cos (\Phi +\Theta)$  and  $Y'=r \cos (\Phi +\Theta)$

b)  $X'=r \cos (\Phi +\Theta)$  and  $Y'=r \sin (\Phi +\Theta)$

c)  $X'=r \cos (\Phi -\Theta)$  and  $Y'=r \cos (\Phi -\Theta)$

d)  $X'=r \cos (\Phi +\Theta)$  and  $Y'=r \sin (\Phi -\Theta)$

Answer : b

9.If the scaling factors values  $s_x$  and  $s_y < 1$  then

a) It reduces the size of object

b) It increases the size of object

c) It stunts the shape of an object

d) None

Answer : a

10.If the value of  $s_x=1$  and  $s_y=1$  then

a) Reduce the size of object

b) Distort the picture

c) Produce an enlargement

d) No change in the size of an object

Answer : d

### UNIT III

1 Three dimensional computer graphics become effective In the late

a. 1960

b. 1980

c. 1970

d. 1950

Answer: b

2 A three dimensional object can also be represented using\_\_\_\_\_.

a. Method

b. Equation

c. Point

d. None of these

Answer: b

3 An\_\_\_\_\_ can be considered as an extension of spherical surface.

a. Bezier

b. Ellipsoid

c. Shearing

d. None of these

Answer: b

4 \_\_\_\_\_curve is one of the sp line approximation methods.

a. Bezier

b. Ellipsoid

c. Shearing

d. None of these

Answer: a

- 5 A Bezier curve is a polynomial of degree \_\_\_\_\_ the no of control points used.
- One more than
  - One less than
  - Two less than
  - None of these

Answer: b

- 6 The sweep representation of an object refers to the
- 2D representation
  - 3D representation
  - Both a & b
  - None of these

Answer: b

- 7 The types of projection are
- Parallel projection and perspective projection
  - Perpendicular and perspective projection
  - Parallel projection and Perpendicular projection
  - None of these

Answer: a

- 8 \_\_\_\_\_ are the three dimensional analogs of quad trees.
- Quadric
  - Octrees
  - Geometry
  - None of these

Answer: b

- 9 \_\_\_\_\_ refer to the shapes created by union, intersection and difference of given shapes.
- Wire frame model
  - Composite transformation
  - Constructive solid geometry methods
  - None of these

Answer: c

In which projection, the plane normal to the projection has equal angles with these three axes

- 10
- Wire frame projection
  - Constructive solid geometry projection
  - Isometric projection
  - Perspective projection

Answer: c

#### UNIT IV

- 1 The basic graphical interactions are
- Pointing
  - Positioning
  - Both a & b
  - None of the above

Answer : c

- 2 \_\_\_\_\_ is a flexible strip that is used to produce smooth curve using a set of point.



- a. Sp line
- b. Scan-line method
- c. Depth-sorting method
- d. None of these

Answer : a

- 3 Cubic sp line are
- a. Simple to compute
  - b. Provides continuity of curves
  - c. Both a & b
  - d. None of these

Answer : c

- 4 The parametric form of 3D sp line are
- a.  $X=f(t), y=g(t), z=h(t)$
  - b.  $X=a_0, y=b_0, z=c_0$
  - c.  $F(t)=0, g(t)=0, h(t)=0$
  - d. None of these

Answer : a

- 5 The problem of hidden surface are
- a. Removal of hidden surface
  - b. Identification of hidden surface
  - c. Both a & b
  - d. None of these

Answer : c

- 6 The algorithm of hidden surface are
- a. Object-space method
  - b. Image-space method
  - c. Both a & b
  - d. None of these

Answer : c

- 7 The method which is based on the principle of comparing objects and parts of objects to each other to find which are visible and which are hidden are called
- a. Object-space method
  - b. Image-space method
  - c. Surface-space method
  - d. Both a & b

Answer : a

- 8 Which surface algorithm is based on perspective depth ?
- a. Depth comparison
  - b. Z-buffer or depth-buffer algorithm
  - c. subdivision method
  - d. back-face removal

Answer : b

- 9 A process with the help of which images or picture can be produced in a more realistic way is called
- a. Fractals
  - b. Quad-tree

- c. Rendering
- d. None of these

Answer : c

10 Ray-tracing is an extension of

- a. Ray calling
- b. Ray casting
- c. Ray sampling
- d. Ray coherence

Answer : b

#### UNIT – V

1 Jason is defining the target audience for an animation project.  
This is a component of which phase in the process of producing animation?

- a. Pre-production
- b. Animated GIF
- c. Post-Production
- d. Production

Answer : a

2 Short films that use stop motion techniques are what type of animation?

- a. Frame-based animation
- b. HTML
- c. Animation
- d. Production

Answer : a

3 What is another term to describe vector animation?

- a. Vector
- b. Path animation
- c. Alpha
- d. Animation

Answer : b

4 Which type of animation is best suited for creating a flipbook animation?

- a. Frames Per Second
- b. SWF
- c. Frame-based animation
- d. Animation

Answer : c

5 The types of computer animation are

- a. 2D computer animation
- b. 3D computer animation
- c. Both a & b
- d. None of these

Answer : c

6 Special System designed for some training application are known as ?

- a. Video Display Devices
- b. Simulators
- c. GUI
- d. None of above

Answer : b

- 7 The CAD stands for?
- Computer And Data
  - Commonly Available Data
  - Computer Aided Drawing
  - Computer Aided Design

Answer : d

- 8 Graphics programmers create images on the screen or printer either as?
- Vector images
  - Bitmapped images
  - Both (a) and (b)
  - None of these

Answer : a

- 9 Graphics software packages are available for?
- Pictures
  - Charts
  - Graphics
  - All of the above

Answer : d

- ..... is the number of points per centimeter that can be plotted
- 10 horizontally and vertically
- Aspect Ratio
  - Pixel Depth
  - Resolution
  - Dot Pitch

Answer : c

## **XI. GATE QUESTIONS / UGC - NET:**

1. If the Fourier transform of the function  $f(x, y)$  is  $F(m, n)$ , then the Fourier transform of the function  $f(2x, 2y)$  is :

- $1/4 F(m/2, n/2)$
- $1/4 F(2m, 2n)$
- $1/4 F(m, n)$
- $1/4 F(m/4, n/4)$

Answer : a

2. Which of the following statement(s) is (are) true?

- Two successive translations are additive.
  - Two successive rotations are additive.
  - Two successive scaling operations are multiplicative
- I & II
  - only II
  - II & III

- d. All the above

Answer : d

3. Given below are three basic rules:

I. Squash and Stretch

II. Slow-in and Slow-out

III. To stage the action properly

These rules are applied in case of :

- a. Rendering
- b. Morphing
- c. Animation
- d. All of the above

Answer : c

4. Which of the following categories of languages do not refer to animation languages?

- a. Graphical languages
- b. General-purpose languages
- c. Linear-list notations
- d. None of the above

Answer : d

5. Match the following:

List- I

List- II

- |                            |                          |
|----------------------------|--------------------------|
| a. Tablet, Joystick        | i Continuous devices     |
| b. Light Pen, Touch Screen | ii. Direct devices       |
| c. Locator, Keyboard       | iii. Logical devices     |
| d. Data Globe, Sonic Pen   | iv. 3D interaction wires |

- a. ii i iv iii
- b. i iv iii ii
- c. i ii iii iv
- d. iv iii ii i

Answer : d

## **XII. WEBSITES:**

<https://www.edx.org/course/computer-graphics-uc-san-diegox-cse167x-3>

<https://www.edx.org/course/foundations-computer-graphics-uc-berkeleyx-cs-184-1x>

<https://www.coursera.org/learn/interactive-computer-graphics>

## **XIV. EXPERT DETAILS: NA**

## **XV. JOURNALS:**

### **INTERNATIONAL**

- 1. ICTACT Journal On Image & Video Processing
- 2. International Journals Of Computer Graphics & Techniques

## **NATIONAL**

1. Inventi Impact : Image & Video Processing

## **XVI. LIST OF TOPICS FOR STUDENT SEMINARS:**

- 1) Alpha compositing
- 2) Anisotropic filtering
- 3) Anti-aliasing
- 4) Axis-aligned bounding box.

## **XVII. CASE STUDIES / SMALL PROJECTS:**

1. Using Python how to Plot a bar chart, histogram, pie chart
2. Using Python how to do the data analyzing from excel sheet
3. Code Design
4. Computer Graphics in Automotive Design