

FACULTY OF COMPUTER APPLICATIONS
Bachelor of Computer Applications

- **Sem.** 6
- **Subject Code** : 05BC3604
- **Subject** : Computer Graphics
- **Course Objectives** :
 1. Basic understanding of the core concepts of computer graphics.
 2. Understand the basic principles of implementing computer graphics primitives.
 3. Familiarity with key algorithms for modeling and rendering graphical data.
 4. Gain experience in constructing interactive computer graphics programs
 5. Develop design and problem solving skills with application to virtual reality.
- **Prerequisites** : Knowledge of Linear Algebra, Matrices & Geometry

Unit No	Topics Covered	No of lectures required
1	Fundamentals of Computer Graphics: Introduction to Computer Graphics, Applications of computer graphics, Graphics input devices, Graphics hardcopy devices, Video Display Devices, Raster-Scan Displays, Random-Scan Displays	06
2	Output Primitives: Introduction, Line-Drawing DDA Algorithm, Bresenham's Line drawing Algorithm, Bresenham's Circle-Generating Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm, Character Generation	06
3	2D concepts and transformation: Basic Transformations (translation, rotation, scaling), homogeneous coordinates, reflection and shearing, Point Clipping, Cohen-Sutherland Line Clipping algorithm	06

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4	3D concepts and transformations: Basic Transformations (translation, rotation, scaling, Reflections, Shears), Composite Transformations, parallel and perspective transformation, General Parallel-Projection Transformations	06
5	Virtual Reality Introduction to VR, Modern VR experiences, Geometric Models, Changing Position and Orientation, Interaction, recent trends in VR	06

Course Outcomes:

1. Understand and implement graphics terms and concepts.
2. Understand and apply various output primitives.
3. Apply the 2D graphics operations into the objects.
4. Apply the 3D graphics concepts and its transformation methods.
5. Understand of Virtual Reality models and recent trends.

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	M			M	H		H		L	L	L
CO2		L	M	H					M	L	
CO3			L		M	L	M				M
CO4	M	M				L					M
CO5			M				H	H	M	M	L

Text Book :

1. Computer Graphics, D. Hearn and P. Baker, Pearson Education, 2nd Edition.
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, Latest Edition, 2019

Reference Books :

1. Computer Graphics, Sinha, Amarendra N., Udai, Arun D, Tata McGraw Hill Pvt Ltd, Latest Edition, 2008.
2. Principles of Computer Graphics, Shalini Govil-Pai, Springer, Latest Edition, 2004.
3. Computer Graphics - A programming approach, Harrington & Steven, Tata McGraw Hill Pvt Ltd, 2nd edition.

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Web References:

1. <https://www.javatpoint.com/computer-graphics-tutorial>
2. <https://www.tutorialandexample.com/computer-graphics-tutorial>
3. <http://www.opengl-tutorial.org/beginners-tutorials/tutorial-3-matrices>

App References:

1. https://play.google.com/store/apps/details?id=com.faadooengineers.free_computergraphics&hl=en_IN&gl=US
2. <https://play.google.com/store/apps/details?id=com.akb.cgm&hl=en&gl=US>

Syllabus Coverage from text /reference book & web/app reference:

Unit #	Reference	Chapter Numbers
1	Textbook 1	Ch 1,2
2	Textbook 1	Ch 3
3	Textbook 1	Ch 5,6
4	Textbook 1	Ch 9,10
5	Textbook 2	Ch 1,3,10

PRACTICALS Based on 'C'

Unit no.	List of Practicals
1	<ol style="list-style-type: none"> 1. Introduction to Graphics.h Library and syntax 2. Write a C program to draw Point. 3. Write a C program to draw circle and fill the color. 4. Write a C program to draw rectangle and fill the color. 5. Write a C program to draw circle and fill the color. 6. Write a C program to draw polygon and fill the color. 7. Write a C program to draw Ellipse and fill the color. 8. Write a C program to draw Arc and fill the color. 9. Write a C program to draw Line and fill the color. 10. Write a C program to draw Triangle and fill the color.
2	<ol style="list-style-type: none"> 1. Write a C program to draw a bar chart using graphics. 2. Write a C program to draw pie chart. 3. Write a C program to write text in rectangle and fill the color. 4. Write a C Program to draw animation using increasing circles filled with different colors and patterns. 5. Write a Program to print your name in Hindi script on console output in C. 6. Write a C Program to create Indian flag. 7. Write a C Program to create house and fill the specified color.

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	<ul style="list-style-type: none"> 8. Write a Program to make a moving colored car using inbuilt functions. 9. C graphics program which performs countdown for 30 seconds. 10. Write a C Program to implement Digital Clock.
3	<ul style="list-style-type: none"> 1. Write a C Program to perform 2D translation. 2. Write a C Program to perform 2D rotation. 3. Write a C Program to perform 2D Scaling. 4. Write a C Program to perform 2D reflection. 5. Write a C Program to perform 2D shearing. 6. Write a C Program to implement Cohen–Sutherland Line clipping. 7. Write a program for DDA line Method. 8. Write a program for Bresnham’s line drawing Algorithm. 9. Write a program for Bresnham’s circle drawing Algorithm. 10. Write a program for drawing a polygon.
4	<ul style="list-style-type: none"> 1. Write a C Program to perform 3D translation. 2. Write a C Program to perform 3D rotation. 3. Write a C Program to perform 3D scaling. 4. Write a program for composite Transformation. 5. Write a program to write your name in Hindi using any character generation method.
5	<ul style="list-style-type: none"> 1. Introduction to unity software 2. Intro to 2D Game system in unity 3. Sprite Animation in Unity 4. 2D Components 5. UI system in Unity 6. 2D Game Project
