

Sri Sathya Sai College for Women, Bhopal
(An Autonomous College Affiliated to Barkatullah University Bhopal)
Department of Higher Education, Govt. of M.P.
Under Graduate Syllabus (Annual Pattern)
As recommended by Central Board of Studies and approved by the Governor of M. P.
wef 2023-2024
(Session 2023-24)
(NEP-2020)

Class	B.C.A.
Year	III Year
Subject	Computer Application
Course Title	Computer Graphics (Group A – Paper I)
Course Type	Discipline Specific Elective (DSE)
Credit Value	4
Max. Mark	30+70 (Minimum Marks 35)
Course Outcome: On successful completion of this course , the students will be able to: <ol style="list-style-type: none"> 1. Understand The basics of computer graphics, different graphics systems and applications of computer graphics. 2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. 3. Use of geometric transformations on graphics objects and their application in composite form. 4. Explore scene with different clipping methods and its transformation to graphics display device. 5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. 6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this. 	

Particular

Unit-I	Introduction to Computer Graphics: Application of Computer Graphics, Interactive and Passive Graphics. Graphic Systems: Display Processor, Cathode Ray Tube (CRT), Random Scan vs Raster Scan, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Display. Input–Output Devices: Input Devices , Trackball, Light Pen, Image Scanner, Output Devices, Plotters.
Unit-II	Scan Conversion a line: Scan Conversion Definition, Scan Converting a Point, Scan Converting a Straight Line, DDA Algorithm. Scan Conversion Circle: Defining a Circle, Defining a Circle using Polynomial Method, Defining a Circle using Polar Coordinates Method, Bresenham’s Circle Algorithm, Midpoint Circle Algorithm. Scan Converting Ellipse: Scan converting a Ellipse, Polynomial Method, Trigonometric Method, Midpoint Ellipse Algorithm

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Unit-III	<p>Filled Area Primitives: Boundary Fill Algorithm, Flood Fill Algorithm, Scan Line Polygon Fill Algorithm.</p> <p>2D Transformations: Introduction of Transformation, Translation, Scaling, Rotation, Reflection, Shearing, Matrix Representation, Homogenous Coordinates, Composite Transformation, Pivot Point Rotation.</p> <p>2D Viewing: Window, Window to Viewport Co-ordinate Transformation, Zooming, Panning.</p>
Unit-IV	<p>Clipping Techniques: Clipping, Point Clipping, Line Clipping, Midpoint Subdivision Algorithm, Text Clipping, Polygon, Sutherland-Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping.</p> <p>Pointing & Positioning: Pointing & Positioning Techniques, Elastic or Rubber Band Techniques, Dragging.</p> <p>Shading: Introduction of Shading, Constant Intensity Shading, Gouraud shading, Phong Shading.</p>
Unit-V	<p>Animation: Animation, Application Areas of Animation, Animation Functions.</p> <p>3D Computer Graphics: Three Dimensional Graphics, Three Dimensional Transformations, Scaling, Rotation, Rotation about Arbitrary Axis, Inverse Transformations, Reflection, Shearing</p> <p>Hidden Surfaces: Hidden Surface Removal, Back Face Removal Algorithm, Z-Buffer Algorithm, Painter's Algorithm, Scan Line Algorithm, Subdivision Algorithm.</p>
Keywords/Tags:	Graphic Systems, Input-Output Devices, Scan Conversion, 2D Transformations, 2D-Viewing, Clipping Techniques, Shading, Animation, 3D Computer Graphics, Hidden Surfaces.

Suggestion Books:

1. Hearn: Computer Graphics C Version, Pearson Education India; 2nd edition, 2002
2. John Hughes, Andries van Dam, Morgan McGuire, David Sklar, James Foley: Computer Graphics: Principles and Practice, Addison-Wesley Professional, 3rd edition, 2013.
3. Zhigang Xiang, Roy Plastock: Compute Graphics, Mc Graw Hill Education, 2nd edition, 2006.

Reference Books:

1. James D Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes: Hughes: Introduction to Computer Graphics, Addison Wesley, 1993
2. Chopra Dr. Rajiv: Computer Graphics, S Chand & Co Ltd.
3. Desai: Computer Graphics, PHI, 2008.
4. Asthana, R.G.S: Computer Graphics for Scientists and Engineers, New Age International Pvt Ltd.

Suggested Digital Platforms Web links:

<https://www.eshiksha.mp.gov.in/mpdhe>
<https://epgp.inflibnet.ac.in>

Suggested equivalent online courses:

<https://nptel.ac.in/courses/106103224>
<https://nptel.ac.in/courses/106106090>








Scheme of Marks:

Suggested Continuous Evaluation Methods:

Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 marks, Term End Exam Theory: 70 marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE):	Class Test Assignment/ Presentation	30
External Assessment: University Exam Section Time:03.00 Hours	Section (A) Very Short questions Section (B) Short questions Section (C) Long questions	70
		Total 100

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Class	B.C.A.
Year	III Year
Subject	Computer Application
Course Title	Computer Graphics Lab (Group A - Paper I)
Course Type	Discipline Specific Elective (DSE)
Credit Value	2
Max. Mark	30+70 (Minimum Marks 35)

Course Outcome: On successful completion of this course , the students will be able to:

1. Understand The basics of computer graphics, different graphics systems and application of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their conversion analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.
4. Extract scene with different clipping methods and its transformation to graphics display device.
5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
6. Render projected objected to naturalize the scene in 2D view and use of illumination models for this.

Particular

List of Practicals :

1. Write a Program to draw basic graphics construction like line, circle, arc, ellipse and rectangle.
2. Write a program of Translation, Rotation, and Scaling using Composite Transformation.
3. Write a program to draw a Circle using midpoint implementation Method.
4. Write a program to draw Bezier curve.
5. Program to rotate a rectangle about its midpoint.
6. Program to clip a line using Liang Barsky Method.
7. Program to implement Standard Perspective Projection in 3-Dimensions.
8. Program to implement Parallel Projection in 3-Dimensions.
9. Write a Program to implement Digital Clock.
10. Write a Program to draw animation using increasing circles filled with different colors and patterns.
11. Write a Program to control a ball using arrow keys.
12. Write a Program to implement Bouncing Ball in vertical direction.



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Suggested Digital Platforms Web links:

<https://www.eshiksha.mp.gov.in/mpdhe>
<https://epgp.inflibnet.ac.in>

Suggested equivalent online courses:

<https://nptel.ac.in/courses/106103224>
<https://nptel.ac.in/courses/106106090>

Scheme of Marks:**Suggested Continuous Evaluation Methods:**

Maximum Marks: 100		
Internal Assessment :	Class Interaction / Quiz Attendance Assignments (Charts / Model Seminar / Rural Service / Technology Dissemination / Report of Excursion / Lab Visits / Survey / Industrial visit)	30
External Assessment:	Viva Voce on Practical Practical Record File Table Work / Experiments	70
		Total 100

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