SEMESTER S4

COMPUTER GRAPHICS

Course Code	**PEITT414**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To build an understanding of the fundamental concepts of computer graphics.
2. To familiarize the working principles of various display technologies.
3. To understand the three dimensional transformations in graphics.

SYLLABUS

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Module No.	Syllabus Description	Contact Hours
1	Basics of Computer Graphics and its Applications. Raster Scan & Random Scan systems. Display Technologies: Overview of CRT, LCD, Plasma, LED, OLED, AMOLED, E-Paper displays. Output Primitives – Line Drawing Algorithms - DDA, Bresenham's, Midpoint Circle generation algorithm. Filled Area Primitives – Scan Fill, Flood Fill, Boundary Fill. Inside outside tests.	**9**
2	Two-dimensional transformations - Translation, Rotation, Scaling, Reflection and Shearing, Composite transformations, Matrix representations, and homogeneous coordinates. 2-D Clipping- Window to viewport transformation, Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Sutherland-Hodgeman, and Weiler-Atherton Polygon clipping algorithms.	**9**
3	Three-Dimensional Concepts: Three-Dimensional Display, Methods Parallel Projection, Perspective Projection, Depth Cueing, Visible Line and Surface, Identification, Surface Rendering, Exploded and Cutaway Views, Three-	**9**

	Dimensional and Stereoscopic Views Three-Dimensional transformation, Translations, Scaling, Rotation, Viewing Transformation, The Perspective, Algorithms, Three-Dimensional Clipping, Perspective view of Cube	
4	Visible Surface Detection Methods: Depth Buffer, A-Buffer, Scan line, Depth sorting methods. Hidden Surface Removal: Back face detection - Z-buffer method - Painter's algorithm - scan-line algorithm – BSP Trees - Area sub-division method - Ray tracing - Animation - Morphing. Introduction to Digital Image Processing.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

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End Semester Examination Marks (ESE):

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Describe the working principles of graphics devices. Illustrate line drawing, circle drawing and polygon filling algorithms.	**K3**
CO2	Demonstrate geometric representations and transformations on 2D objects. Explain the working of line and polygon clipping algorithms	**K3**
CO3	Apply 3D transformation and viewing into the real-world applications	**K3**
CO4	Describe visible surface detection methods and digital image processing.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	-	-	-	-	3
CO2	3	3	3	3	3	-	-	-	-	-	-	3
CO3	3	3	3	3	3	-	-	-	-	-	-	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3

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Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Computer Graphics with OpenGL	Donald Hearn and M. Pauline Baker	Pearson	4th Edition 2013

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Principles of Interactive Computer Graphics	William M. Newman and Robert F. Sproull	McGraw Hill	2nd Edition 2001
2	Computer Graphics Using OpenGL	Francis Hill Jr.	Pearson Education	3rd Edition 2007
3	Computer Graphics Programming in OpenGL with C++	V. Scott Gordon, John Clevenger	De Gruyter	2024

Video Links (NPTEL, SWAYAM…)	
No.	**Link ID**
1	https://youtu.be/V4mP2pQyou0?si=znq_J6ES0MB03Qkm
2	https://youtu.be/8HWvyahgesY?si=1k1hCqfNE19Z00S3
3	https://youtu.be/7iYggzuo6Ks?si=G0Xnf1UA_dRRJaLf
4	https://youtu.be/b1Qpvqm0UAo?si=M6ALob-iLJ9E0i_r

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