5 Years Integrated M.Sc.(IT)(Semester - 5)

IT5015-Fundamentals of Computer Graphics
Teaching Schedule

Objective of the Course:

To introduce the concepts of computer graphics techniques and to learn the fundamentals of geometric transformations and viewing algorithms for 2D - 3D graphics, lightening models, colour models and animation.

CO1: Understand the basic concept of computer graphics, display devices and raster graphics algorithms.
CO2: Describe and illustrate polygon inside tests and filling algorithms.
CO3: Deriving and applying geometric transformation to 2D objects.
CO4: Discuss two-dimensional viewing methods.
CO5: Understanding the concept of 3D, deriving and applying transformation to 3D objects.
CO6: Understanding animation, fractals, illumination models and colour models.

Unit	Sub Unit	Topics	No. of Lectures	Reference Chapter/ Additional Reading	Teaching Methodology
1	**Introduction to Computer Graphics and Graphics Primitives**				
	1.1	Applications of computer graphics, Computer graphics and related fields	1	HB #1 – Pg No. 24-54 HS #2, AD #1	Discussion
	1.2	Display devices: Display technologies, raster-scan display, random scan display, hardcopy display devices	2	HB #2 – Pg No. 56-76, 92-93 HS #2, AD #1	Topic Slides
	1.3	Input devices	1	HB #2 – Pg No. 80-90, AD #1	Topic Slides
	1.4	Graphics standards, Frame buffers and display controllers	1	HB #2 – Pg No. 98-99, 114, AD #1	Topic Slides
	1.5	Scan converting lines: DDA, Bresenham's line algorithm	3	HB #3 – Pg No. 104-111 HS #1, AD #2 Pg. No. 31-38, #3 Pg. No. 71-80	Chalk n Talk Hands on
	1.6	Circle-generating algorithms: Properties of circle, eight-way symmetry, Midpoint circle algorithm	2	HB #3 – Pg No. 117-118, AD #2 Pg. No. 39-40, #3 Pg. No. 81-85	Chalk n Talk Hands on
2	**Polygons**				
	2.1	Polygons and its representation	1	HS #3, AD #4	Discussion
	2.2	Inside tests: Odd-even, winding number	2	HB #3 – Pg No. 145-146 HS #3, AD #4	Chalk n Talk Hands on
	2.3	Filling polygons: Boundary fill, scan fill, flood fill	2	HB #3 – Pg No. 137-143, 147-150 HS #3, AD #4	Chalk n Talk Topic Slides
	2.4	Pattern Filling, Line Styles and Pen Style	1	HB #4 – Pg No. 164-169,178-182 HS #3, AD #4	Topic Slides
	2.5	Character Generation and character attributes, Antialiasing	1	HB #3 – Pg No. 151-157 HS #3	Topic Slides
3	**Two-Dimensional Geometric Transformations**				
	3.1	Basic transformations: translation, scaling and rotation	1	HB #5 – Pg No. 204-207, AD #5	

	3.2	Matrix representation and homogeneous coordinated	1	HB #5 – Pg No. 208-210 HS #4, AD #5	Topic Slides
	3.3	Composite transformations: translation, scaling and rotation	3	HB #5 – Pg No. 211-220 HS #4, AD #5	Hands on, Discussion
	3.4	General pivot-point rotation, fixed-point scaling and scaling directions	2		Hands on, Discussion
	3.5	Other transformation: reflection and shear	2	HB #5 – Pg No. 221-225 HS #4, AD #5	Hands on, Discussion
4	**Two-Dimensional Viewing**				
	4.1	The viewing pipeline, Window-to-viewport coordinate transformation	2	HB #6 – Pg No. 237-243 HS #6, AD #6	Topic Slides
	4.2	Clipping operations, Point Clipping	1	HB #6 – Pg No. 245, HS #6, AD #6	Topic Slides
	4.3	Clipping Lines: Cohen – Sutherland, Liang – Barskey, Nicholl-Lee-Nicholl	2	HB #6 – Pg No. 245-254, HS #6, AD #6	Topic Slides Discussion
	4.4	Clipping Polygons: Sutherland-Hodgman and Weiler-Atherton	3	HB #6 – Pg No. 257-263, AD #6	Topic Slides Discussion
	4.5	Text Clipping and exterior clipping	1	HB #6 – Pg No. 264-265, AD #6	
5	**Three-Dimensional Concepts, Transformations and Viewing**				
	5.1	3D display methods	1	HB #9 – Pg No. 317-321, AD #7	Topic Slides
	5.2	3D Transformations: Translation, rotation, scaling, reflections and shears	3	HB #11 – Pg No. 428-446 HS #8 Page No. 244-256 AD #7	Topic Slides Hands on
	5.3	Projections: Parallel and perspective	3	HB #12 – Pg No. 258-475 HS #8 Page No. 261-301, AD #7	Topic Slides Hands on
6	**Advance Topic in Computer Graphics**				
	6.1	Computer Animation	2	HB #16 – Pg No. 604-616, AD #11 Pg. No. 312-317	Topic Slides
	6.2	Fractals	1	HB #10 – Pg No. 382-391, AD #11 Pg. No. 322-329	Topic Slides
	6.3	Illumination Models:	1	HB #14 – Pg No. 516-520 HS #10, AD #9 Pg. No. 268-270	
	6.4	Color Models	1	HB #15 – Pg No. 584-595, AD #9 Pg. No. 279-287	Topic Slides

Text Book		
1.	Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson	**[HB]**
Reference Book:		
1.	Apurva A Desai. Computer Graphics, PHI Learning	**[AD]**
2.	Herrington S. Computer Graphics, Prentice Hall	**[HS]**