TCET/FRM/IP-02/09	Revision: A

Semester Plan

(Theory)

Semester: V **Course: IT**

Subject: Computer Graphics and Virtual Reality	**4 Lectures / Week**	**Class: TE IT A**

Sr. No.	**Prerequisite/ Bridge course:**	**Duration (Week /Hrs)**	**Modes of Learning**	**Recommended Sources**
1	**Matrix calculations in maths** **Programming using C++ or Java**	**6**	**Self Learning/ Revision**	**Text Book:** 1.Donald Hearn and M. Pauline Baker, “Computer Graphics”, Pearson Education. 2.R. K Maurya, “Computer Graphics with Virtual Reality”, Wiley India. **Course Link:** 1. http://www.tutswing.com/cplusplus-home 2. www.nptel.ac.in/courses/106106090

Sr. No.	**Module No.**	**Lesson No.**	**Topics Planned (Technology to be used)**	**Teaching Aids Required**	**Planned /Completion Date**	**TextBook, Reference,Resource Book Reference**	**Remarks**
1		L 1.1	SOP – CGVR Theory	Power point presentation, Chalk & Board	07.10.2017	1 to 6	
2		L 1.2	SOP – CGVR Practical	Power point presentation, Chalk & Board	07.11.2017	1 to 6	
3		L 1.3	SOP – CGVR OBE	Power point presentation, Chalk & Board	07.12.2017	1 to 6	
4	1	L 2.1	Introduction, Display Devices,	Power point presentation, Chalk & Board	13/7/2017	1.2, 1.1	
5		L 2.2	Bitmap and Vector based graphics,	Power point presentation, Chalk & Board	14/7/2017	1.2, 1.11.2	
6		L 2.3	Overview of Coordinate system, RGB & CMY color models	Power point presentation, Chalk & Board	17/7/2017	1.2, 1.11.5	
7		L 2.4	Scan Conversion of: point, line using Digital differential analyzer	Power point presentation, Chalk & Board	18/7/2017	1.2, 1.11.6.1	
8		L 3.1	Scan Conversion of: point, line using Bresenham’s algorithm	Power point presentation, Chalk & Board	18/7/2017	1.1, 1.11.6.2	
9		L 3.2	circle using midpoint approach,	Power point presentation, Chalk & Board	19/7/2017	1.1, 1.11.6.3	
10		L 3.3	Curve Generation: Bezier and B-Spline curves.	Power point presentation, Chalk & Board	20/7/2017	1.1, 1.11.5	
11		L 3.4	Introduction to fractals: generation procedure	Power point presentation, Chalk & Board	21/7/2017	1.1, 1.11.6	
12		L 4.1	Introduction to fractals: classification, dimension and Koch Curve	Power point presentation, Chalk & Board	25/7/2017	1.2,1.11.8	
13	2	L 4.2	Area filling : Inside/Outside Test, Even-Odd Method, Winding Number Method	Power point presentation, Chalk & Board	26/7/2017	1.2,2.8, 2.9, 2.9.2	
14		L 4.3	Area filling : Scan line Fill Algorithm	Power point presentation, Chalk & Board	27/7/2017	1.2,2.9.4	
15		L 4.4	Polygon Fill Algorithm, Boundary Fill and Flood Fill algorithm	Power point presentation, Chalk & Board	28/7/2017	1.2,2.9.5	
16		L 5.1	Basic Geometrical 2D transformations : Translation, Rotation	Power point presentation, Chalk & Board	08.01.2017	1.2,2.10, 2.10.2	

17		L 5.2	Basic Geometrical 2D transformations : Scaling, Reflection	Power point presentation, Chalk & Board	08.02.2017	1.2,2.10.4	
18		L 5.3	Basic Geometrical 2D transformations : Shear, their homogeneous Matrix representation	Power point presentation, Chalk & Board	08.03.2017	1.2,2.10.6, 2.10.8	
19		L 5.4	Basic Geometrical 2D transformations: Composite transformation	Power point presentation, Chalk & Board	08.04.2017	1.2,3.8.1	
20	3	L 6.1	Introduction ,Viewing Pipeline	Power point presentation, Chalk & Board	08.08.2017	1.2,3.8.11.2,	
21		L 6.2	View Coordinate reference frame, Window to viewport transformation, Point clipping	Power point presentation, Chalk & Board	08.09.2017	1.2,3.8.1	
22		L 6.3	Line clipping: Cohen Sutherland Algorithm	Power point presentation, Chalk & Board	08.10.2017	1.2,3.8.3.1	
23		L 6.4	Line clipping: Liang Barsky Algorithm	Power point presentation, Chalk & Board	08.11.2017	1.2,3.8.3.1.c	
24		L 7.1	Polygon clipping: Sutherland Hodgeman polygon clipping Algorithm	Power point presentation, Chalk & Board	16/8/2017	1.2,3.8.3.2	
25		L 7.2	Polygon clipping: Weiler Atherton, Text Clipping.	Power point presentation, Chalk & Board	18/8/2017	1.2,3.8.3.3	
26	4	L 7.3	Three Dimensional transformations: Translation, Scaling	Power point presentation, Chalk & Board	24/8/2017	1.2,4.8.1	
27		L 7.4	Three Dimensional transformations: Rotations, Composite Transformations	Power point presentation, Chalk & Board	24/8/2017	1.2,4.8.3	
28		L 8.1	Three Dimensional object representation: Polygon Surfaces, Tables, Meshes.	Power point presentation, Chalk & Board	30/8/2017	1.2,4.8.5	
29		L 8.2	Three Dimensional Viewing Pipeline , Viewing transformation	Power point presentation, Chalk & Board	31/8/2017	1.2,4.8.6	
30		L 8.3	Projections : Parallel(Oblique and orthographic), Perspective (one Point)	Power point presentation, Chalk & Board	09.01.2017	1.2,4.8.6	
31		L 8.4	Perspective (one Point)	Power point presentation, Chalk & Board	09.05.2017	1.2,4.8.6	
32	5	L 9.1	Key Frame Animation, Animation Sequence	Power point presentation, Chalk & Board	09.06.2017	1.2,5.9.1, 5.9.2-5.9.6	
33		L 9.2	Motion Control Methods, Morphing, Warping(only Mesh Warping).	Power point presentation, Chalk & Board	09.07.2017	1.2,5.9.7 5.9.8	
34		L 9.3	Virtual Reality : Basic Concepts , Classical Components of VR System	Power point presentation, Chalk & Board	09.08.2017	1.2,6.9.1	
35		L 10.1	Types of VR Systems, Three Dimensional Position Trackers	Power point presentation, Chalk & Board	09.12.2017	1.2,6.9.3	
36		L 10.2	Navigation and Manipulation Interfaces, Gesture Interfaces	Power point presentation, Chalk & Board	13/9/2017	1.1, 1.2, 2.2, 6.9.4	
37		L 10.3	Graphical Display, Sound displays,	Power point presentation, Chalk & Board	14/9/2017	1.1, 1.2, 2.2,6.9.5	
38		L 10.4	Haptic Feedback, Input Devices	Power point presentation, Chalk & Board	15/9/2017	1.1, 1.2, 2.2,6.9.5	
39		L 11.1	Graphical Rendering Pipeline,	Power point presentation, Chalk & Board	19/9/2017	1.3, 2.1, 6.9.5	
40		L 11.2	Haptic Rendering Pipeline, Open GL rendering pipeline	Power point presentation, Chalk & Board	20/9/2017	1.3, 2.1,6.9.5	
41		L 11.3	Applications of Virtual Reality	Power point presentation, Chalk & Board	21/9/2017	1.3, 2.1,6.9.7	

42	6	L 11.4	Geometric Modeling: Virtual Object Shape, Object Visual Appearance	Power point presentation, Chalk & Board	22/9/2017	1.3, 2.1,7.9.1	
43		L 12.1	Kinematics Modeling: Object Position, Transformation Invariants, Object Hierarchies	Power point presentation, Chalk & Board	26/9/2017	1.3, 2.1,7.9.2	
44		L 12.2	Physical Modeling: Collision Detection, Surface Deformation, Force computation.	Power point presentation, Chalk & Board	10.03.2017	1.3, 2.1,7.9.3	
45		L 12.3	Physical Modeling: Force Computation. Behavior Modeling	Power point presentation, Chalk & Board	10.04.2017	1.3, 2.1,7.9.5	
46		L 12.4	Introduction , Programming through VRML : Defining and Using Nodes and Shapes	Power point presentation, Chalk & Board	10.05.2017	1.3, 2.1,8.9.1	
47		L 13.1	VRML Browsers , Java 3D :Visual Object Definition by Shape 3D instances	Power point presentation, Chalk & Board	10.06.2017	8.9.1	
48		L 13.2	Defining personal visual object class, ColorCube Class	Power point presentation, Chalk & Board	10.07.2017	8.9.7	
49		L 13.3	Geometric - Utility Classes, Geometry Classes , Attributes	Power point presentation, Chalk & Board	10.12.2017	8.9.7	
50		L 13.4	Revision and Doubt Clearing	Power point presentation, Chalk & Board	13/10/2017	--	
Remark: Course:		Syllabus Coverage:		Practice Session: 1 L 13.4		Beyond Syllabus: 2 L2.3, L9.1	
No. of (lectures planned)/(lecture taken): 51							
Advanced course: Multimedia Systems, Gaming, Animation				**20 Hours**	**Online NPTEL videos with Hands on Training in Laboratory**	**Web sources:** **• https://ocw.mit.edu/courses/comparative-media-studies-writing/cms-608-game-design-fall-2010/study-materials/** **• https://ocw.mit.edu/courses/comparative-media-studies-writing/cms-608-game-design-fall-2010/study-materials/** **• https://www.university.youth4work.com/AAG_Academy-of-Animation-and-Gaming/study**	

Text Books:

1.1. Donald Hearn and M. Pauline Baker, “Computer Graphics”, Pearson Education.
1.2. R. K Maurya, “Computer Graphics with Virtual Reality”, Wiley India.

References:

2.1. Grigore Burdea, Philippe Coiffet, “Virtual Reality Technology”, Wiley.
2.2. Steven Harrington, “Computer Graphics”, McGraw Hill.
2.3. Rogers, “Procedural Elements of Computer Graphics”, Tata McGraw Hill.
2.4. Vince, “Virtual Reality Systems”, Pearson Education.
2.5. F.S. Hill , Stephen M. Kelley , “Computer Graphics using Open GL” Prentice Hall

Digital Reference:

3.1. https://www.smartzworld.com/notes/computer-graphics
3.2. www.nptel.ac.in/courses/106106090
3.3. https://www.cs.uic.edu/~jbell/CourseNotes/ComputerGraphics

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Mrs. Purvi Sankhe **Dr. Rajesh Bansode**

Name & Signature of Faculty **Signature of HOD** **Signature of Principal /Dean (Academics)**

Date: 14/07/ **Date: 14/07/17** **Date: 14/07/17**

Note:

1. Plan date and completion date should be in compliance

2. Courses are required to be taught with emphasis on resource book, course file, text books, reference books, digital references etc.

3. Planning is to be done for 15 weeks where 1st week will be AOP, 2nd -13th for effective teaching and 14th -15th week for effective university examination oriented teaching, mock practice session and semester consolidation.

4. According to university syllabus where lecture of 4 hrs/per week is mentioned minimum 55 hrs and in case of 3 lectures per week minimum 45 lectures are to be engaged are required to be engaged during the semester and therefore accordingly semester planning for delivery of theory lectures shall be planned.

5. In order to improve score in NBA, faculty members are also required to focus course teaching beyond university prescribed syllabus and measuring the outcomes w.r.t learning course and programme objectives.

6. Text books and reference books are available in syllabus. Here only additional references w.r.t. non –digital/ digital sources can be written (if applicable)

7. Technology to be used in class room during lecture shall be written below the topic planned within the bracket.

Introduction, Display Devices,
Bitmap and Vector based graphics,
Overview of Coordinate system,
Scan Conversion of: point, line using Digital differential analyzer
Scan Conversion of: point, line using Bresenham's algorithm
circle using midpoint approach,
Curve Generation: Bezier and B-Spline curves.
Introduction to fractals: generation procedure
Introduction to fractals: classification, dimension and Koch Curve
Area filling : Inside/Outside Test, Even-Odd Method, Winding Number Method
Area filling : Scan line Fill Algorithm
Polygon Fill Algorithm, Boundary Fill and Flood Fill algorithm
Basic Geometrical 2D transformations : Translation, Rotation
Basic Geometrical 2D transformations : Scaling, Reflection
Basic Geometrical 2D transformations : Shear, their homogeneous Matrix representatic
Basic Geometrical 2D transformations: Composite transformation
Introduction ,Viewing Pipeline
View Coordinate reference frame, Window to viewport transformation, Point clipping
Line clipping: Cohen Sutherland Algorithm
Line clipping: Liang Barsky Algorithm
Polygon clipping: Sutherland Hodgeman polygon clipping Algorithm
Polygon clipping: Weiler Atherton, Text Clipping.
Three Dimensional transformations: Translation, Scaling
Three Dimensional transformations: Rotations, Composite Transformations

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