SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

VII SEMESTER –Open Elective

1908005- VIRTUAL REALITY

Regulation – 2019

Academic Year 2022 – 2023(Odd Semester)

Prepared by

Ms.R.Thenmozhi, Assistant Professor/IT

DEPARTMENT OF INFORMATION TECHNOLOGY
QUESTION BANK

SUBJECT   : **1908005**– Virtual Reality

SEM / YEAR : VII/ IV

	UNIT I- INTRODUCTION TO VIRTUAL REALITY		
	Virtual Reality & Virtual Environment : Introduction – Computer graphics – Real time computer graphics–Flight Simulation –Virtual environments–requirement – benefits of virtual reality- Historical development of VR : Introduction – Scientific Landmark -3D Computer Graphics :Introduction – The Virtual world space – positioning the virtual observer – the perspective projection – human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling- illumination models – Reflection models – Shading algorithms- Radiosity – Hidden Surface Removal – Realism-Stereographic image		
	PART - A		
Q.No	Questions	BT Level	Competence
1	Define Computer Graphics.	BTL 1	Remembering
2	Express about real time computer graphics.	BTL 2	Understanding
3	Illustrate on Flight simulation.	BTL 4	Analyzing
4	List out the advantages of Flight simulation.	BTL 2	Understanding
5	Define Tactile feedback	BTL 1	Remembering
6	What is called ambient light?	BTL 1	Remembering
7	What is meant by immersion give example?	BTL 3	Applying
8	Illustrate with example with the concept of interactive computer graphics.	BTL 3	Applying
9	List the demerits of Flight simulation	BTL 1	Remembering
10	Write short note on acoustic feedback.	BTL 2	Understanding
11	How to create Perspective projection with respect to standard computer graphics?	BTL 6	Creating
12	What is meant by virtual database?	BTL 2	Understanding
13	Point out on visual feedback.	BTL 4	Analyzing
14	Illustrate on database interaction	BTL 4	Analyzing
15	What is meant by physical simulation.	BTL 2	Understanding
16	outline hybrid VR system.	BTL 5	Evaluating
17	Identify the basic requirements of VR environment.	BTL 5	Evaluating
18	What is meant by 3D clipping?	BTL 1	Remembering
19	What is meant by extruding?	BTL 6	Creating

20	Define Swept surface.	BTL 1	Remembering
21	How real time image can be generated?	BTL 3	Applying
22	How texture mapping enables real world images to be incorporated into a computer graphics?	BTL 3	Applying
23	Differentiate between aliasing and antialiasing	BTL 4	Analyzing
24	Assess on Bump mapping.	BTL 5	Evaluating

PART-B

1	Write the benefits of Virtual reality system in detail with example. (13)	BTL 1	Remembering
2	Narrate the historical development of VR system. (13)	BTL 2	Understanding
3	Write a short note on (i) XYZ field angles (7) (ii) XYZ Euler angles (6)	BTL 2	Understanding
4	Examine Illumination model with neat diagram. (13)	BTL 4	Analyzing
5	Assess the following: (i) Monocular depth cues (7) (ii) Binocular depth cues (6)	BTL 5	Evaluating
6	How realism is added into computer graphics? Narrate methodology used for adding realism? .(13)	BTL 5	Evaluating
7	Write the mechanism associated with human vision. (13)	BTL 1	Remembering
8	Examine the concept of back face removal method in detail. (13)	BTL 4	Analyzing
9	Write a short note on (i) color theory (7) (ii) Color Space (6)	BTL 1	Remembering
10	Write a short note on Perspective projection with illustrative diagram. .(13)	BTL 3	Applying
11	Develop the following (i) Diffuse reflection models (7) (ii) Specular reflection models (6)	BTL 6	Creating
12	Explain in detail on Gouraud shading. (13)	BTL 2	Understanding
13	Write a short note on Phong shading. (13)	BTL 1	Remembering
14	Explain in detail on Hidden surface removal. List and explain the algorithm used for Hidden surface removal process. (13)	BTL 2	Understanding
15	Organize in detail on 3D modeling techniques. (13)	BTL 3	Applying
16	Organize the following with neat diagram (i) RGB color model (7) (ii) HSV color model (6)	BTL 3	Applying
17	Examine stereo perspective projection to obtain left and right stereo views of the object. (13)	BTL 4	Analyzing

PART – C

1	Explain in detail about color theory and color models used to represent colors. (15)	BTL 6	Creating
2	Explain the domain under which VR can be used. what are the benefits of VR explain in detail? (15)	BTL 5	Evaluating
3	How to increase realism using illumination model. Explain in detail. (15)	BTL 6	Creating
4	Explain the following (i) Texture Mapping (4) (ii) Bump Mapping (4)	BTL 5	Evaluating

	(iii) Environment Mapping (4) (iv) Stereographic images (3)		
5	Explain in detail on stereo Perspective Projections with illustrative diagrams. (15)	BTL 6	Creating

UNIT II GEOMETRIC MODELLING

Geometric Modeling: Introduction – From 2D to 3D – 3D space curves – 3D boundary representation - Geometrical Transformations: Introduction – Frames of reference – Modeling transformations – Instances –Picking – Flying – Scaling the VE – Collision detection - A Generic VR system: Introduction – The virtual environment – the Computer environment – VR Technology – Model of interaction-VR Systems

PART - A

1	How the flight path of a projectile can be described?	BTL 5	Evaluating
2	Illustrate on 3D digitizer.	BTL 3	Applying
3	What is meant by frame of reference in VR system	BTL 1	Remembering
4	Write the matrix representation for translation transformation?	BTL 6	Creating
5	What is meant by uniform scaling?	BTL 1	Remembering
6	Define fractals	BTL 2	Understanding
7	Write the purpose of Bezier surface patches	BTL 3	Applying
8	Identify the purpose flying technique .	BTL 3	Applying
9	What is meant by direct cosines?	BTL 1	Remembering
10	List the benefits of using instances	BTL 2	Understanding
11	Catmull-Rom spline space curve is either interpolating splines or approximating justify	BTL 4	Analyzing
12	Define instances	BTL 1	Remembering
13	What is meant by object picking in virtual reality	BTL 1	Remembering
14	What is meant by CSG?	BTL 3	Applying
15	Which transformation is termed as rigid body transformation? justify	BTL 4	Analyzing
16	What is meant by procedural modeling?	BTL 2	Understanding

17	Write the need of collision detection in VR system	BTL 2	Understanding
18	Define animation	BTL 1	Remembering
19	Write down the static and dynamic features of VE	BTL 1	Remembering
20	Outline physical constraints to define dynamic objects	BTL 5	Evaluating
21	Where Min-max testing can be applied?	BTL 3	Applying
22	Organize the role of virtual light in VE?	BTL 3	Applying
23	Point out on Teleporting	BTL 4	Analyzing
24	How gesture recognition can be carried out?	BTL 5	Evaluating

PART-B

1	How to convert 2D to 3D? Explain the techniques used to convert 2D to 3D. (13)	BTL 2	Understanding
2	Explain in detail on Bezier space curve. (13)	BTL 2	Understanding
3	Demonstrate to define the curve with B-spline space curve. (13)	BTL 3	Applying
4	Assess how spline curves are categorized? Explain the different types of space curves with illustrative diagram. (13)	BTL 5	Evaluating
5	Explain the various schemes for describing 3D surface boundaries. .(13)	BTL 2	Understanding
6	Write a short note on (i) Translation (4) (ii) Scaling (4) (iii) Rotation (5)	BTL 1	Remembering
7	How XYZ fixed angles described the angles of rotation? Explain in detail. (13)	BTL 3	Applying
8	Explain in detail on XYZ Euler angles of rotation. By applying roll, pitch and yaw. (13)	BTL 4	Analyzing
9	Explain in detail on rotation about arbitrary axis with illustrative diagram. (13)	BTL 1	Remembering
10	Write a short note on compound rotations with sequence of matrix operations. (13)	BTL 1	Remembering
11	Differentiate the following (i) Object picking (7) (ii) Shape picking (6)	BTL 4	Analyzing
12	Explain about flying techniques used for moving around the virtual domain. (13)	BTL 2	Understanding

13	Draw a diagram to integrate various elements of a generic VR system and explain. (13)	BTL 2	Understanding
14	Explain about a generic VR system with basic input, process and output unit. (13)	BTL 1	Remembering
15	Organize the transforms associated with scaling the VE with illustrative diagram. (13)	BTL 3	Applying
16	Draw and explain the diagram to illustrate the transforms associated with object picking. (13)	BTL 3	Applying
17	Examine radiosity that attempts to simulate the multiple diffuse reflection. (13)	BTL 4	Analyzing

PART-C

1	Explain in detail on modeling transformation with matrix representation. (15)	BTL 6	Creating
2	Explain in detail about the purpose of computer environment in generic VR system. (15)	BTL 5	Evaluating
3	Explain in detail on VR technology used to support VR task. (15)	BTL 6	Creating
4	Explain about the different modes of interaction associated with VR technology. (15)	BTL 5	Evaluating
5	Explain in detail about 3D boundary representation. (15)		

UNIT III VIRTUAL ENVIRONMENT

Animating the Virtual Environment: Introduction – The dynamics of numbers – Linear and Non-linear interpolation - The animation of objects – linear and non- linear translation - shape & object in between ing – free from deformation – particle system- Physical Simulation - Introduction – Objects falling in a gravitational field-Rotating wheels – Elastic collisions – projectiles – simple pendulum – springs – Flight dynamics of an aircraft.

PART-A

1	Define dynamics of numbers	BTL 2	Understanding
2	Mention on projectiles	BTL 2	Understanding
3	Express on Quadratic interpolation	BTL 2	Understanding
4	Define Parametric interpolation	BTL 1	Remembering
5	Write the principle of relative motion	BTL 1	Remembering

6	How to interpolate two number using control values?	BTL 4	Analyzing
7	What is the use of Hermite interpolation?	BTL 5	Evaluating
8	Define the FFD technique	BTL 5	Evaluating
9	What is the use of particle systems?	BTL 1	Remembering
10	How temporal aliasing arises when any continuous system us discretely sampled?	BTL 4	Analyzing
11	Write steer matrix representation?	BTL 3	Applying
12	Write roll matrix representation of a wheel?	BTL 3	Applying
13	Define Elastic collision	BTL 1	Remembering
14	Write the matrix representation to move an object from Pi to P2 using linear interpolation.	BTL 3	Applying
15	What is the use of simulation code and display code in temporal aliasing?	BTL 6	Creating
16	What is meant by gear trains?	BTL 2	Understanding
17	Write the translation matrix for rolling a wheel.	BTL 1	Remembering
18	Express coefficient of restitution.	BTL 6	Creating
19	Point out on shape inbetweening?	BTL 4	Analyzing
20	Define object inbetweening.	BTL 1	Remembering
21	Derive the values of u,v and w for deforming 3D objects	BTL 3	Applying
22	Express how Bezier curve A and B can be inbetweened by interpolating their control points	BTL 3	Applying
23	Examine parametric surface patch inbetweening	BTL 4	Analyzing
24	Write the matrix representation to move an object from Pi to P2 using nonlinear interpolation.	BTL 5	Evaluating
PART-B			

1	Explain the following
	    (i) Linear and Nonlinear interpolation (7)
	    (ii) Parametric Interpolation (6)
		BTL 1	Remembering

2	Write a short notes linear translation of animation of the objects with illustrative diagram. (13)	BTL 2	Understanding
3	Illustrate with example how FFD Free form Deformation techniques used for modeling? (13)	BTL 6	Creating
4	How elastic collisions is achieved by direct impact of two particles and oblique impact of two particles. **(13)**	BTL 3	Applying
5	Assess the following (i) Shape inbetweening (5) (ii) Object inbetweening (4) (iii) Parametric line inbetweening (4)	BTL 5	Evaluating
6	Write a short note on Particle systems. (13)	BTL 1	Remembering
7	Explain in detail about the techniques of steerable wheel. (13)	BTL 1	Remembering
8	Express on the motion of a projectile and collision with the ground in detail. (13)	BTL 2	Understanding
9	How to simulate simple pendulums behavior? Derive the acceleration and velocity of it. (13)	BTL 4	Analyzing
10	Derive acceleration and velocity of spring motion by analyzing the dynamic forces acting upon the object. (13)	BTL 4	Analyzing
11	Illustrate the technique of elastic structures with diagram. (13)	BTL 1	Remembering
12	Explain in detail about a simple air craft model. (13)	BTL 2	Understanding
13	Derive the separation of speed and angle influenced by the coefficient of restitution. (13)	BTL 2	Understanding
14	Express the following in detail on (i) Linear angular rotation (7) (ii) Nonlinear angular rotation (6)	BTL 3	Applying
15	Derive the time tg to collide with the ground for an object falling in a gravitational field. (13)	BTL 3	Applying
16	Express the techniques on flight dynamics of an air craft. (13)	BTL 3	Applying
17	Examine nonlinear translation of animation of the objects with illustrative diagram(13)	BTL 4	Analyzing

	PART-C		
1	Explain in detail on Shape and object inbetweening with example. (15)	BTL 6	Evaluating
2	Explain in detail about the animation of objects with linear and non linear translation. (15)	BTL 5	Evaluating
3	Explain how free form deformation techniques applied to a 1D set of ordinates,2D shapes and 3D objects? (15)	BTL 6	Creating
4	Explain the following (i) Oblique impact of two particles (8) (ii) Direct impact of two particles (7)	BTL 6	Creating
5	Explain in detail on (i) XYZ Euler angles for linear angular rotation (8) (ii) XYZ fixed angles for nonlinear angular rotation (7)	BTL 5	Evaluating

UNIT-IV VR HARDWARES & SOFTWARES

Human factors: Introduction – the eye-the ear-the somatic senses-VR Hardware : Introduction – sensor hardware – Head-coupled displays –Acoustic hardware – Integrated VR systems-VR Software: Introduction –Modeling virtual world –Physical simulation- VR toolkits – Introduction to VRML

1	Define Human Computer Interaction	BTL 2	Understanding
2	Point out the human factors relevant to VR systems	BTL 4	Analyzing
3	Point out the function of the actor concepts	BTL 4	Analyzing
4	Compare the refractive power of optical system and human eye.	BTL 1	Remembering
5	Where ossicular system can be used?	BTL 3	Applying
6	What is meant by Accommodation?	BTL 5	Evaluating
7	What is meant by presbyopia?	BTL 1	Remembering
8	Write the principle function of iris?	BTL 1	Remembering
9	Write the phenomenon of persistence of vision?	BTL 2	Understanding
10	Compare binocular and collimated panoramic displays visual field.	BTL 2	Understanding
11	Predict the objective of dVS?	BTL 6	Creating

12	Define sound intensity	BTL 2	Understanding
13	What is meant by HRTF?	BTL 2	Understanding
14	How to measure HRTF?	BTL 5	Evaluating
15	Illustrate about Ambisonics techniques?	BTL 3	Applying
16	What is the purpose of somatic senses?	BTL 6	Creating
17	Illustrate about somatic senses.	BTL 1	Remembering
18	List the group of sensation for stimulating human bodies.	BTL 1	Remembering
19	What is meant by visceral sensation?	BTL 1	Remembering
20	How to apply deep sensations?	BTL 3	Applying
21	Where the bio mouse can be used?	BTL 3	Applying
22	Write the application of powerStick.	BTL 3	Applying
23	Point out the Use of VIM HMD	BTL 4	Analyzing
24	Outline on Convolvotron?	BTL 5	Evaluating
PART-B			
1	Draw the neat diagram and explain about Brodmann's mapping of the somatic sensory area of the cortex. (13)	BTL 2	Understanding
2	Show the diagrammatic cross section of the human eye and explain in detail. (13)	BTL 1	Remembering
3	Explain about outer ear, middle ear and inner ear of human ear with neat diagram. (13)	BTL 2	Understanding
4	Explain in detail about sound perception. (13)	BTL 3	Applying
5	Write a short note on head related transfer function. (13)	BTL 1	Remembering
6	Express the following (i) Coupling between the vestibular and visual system (7) (ii) Sensing linear acceleration (6)	BTL 2	Understanding
7	Write a brief note on VR hardware with illustration. (13)	BTL 1	Remembering

8	Write a short note on
	    (i) Military HMDs (7)
	    (ii) General purpose HMDs (6)
		BTL 4	Analyzing

9	Explain the following
	    (i) Acoustic hardware (7)
	    (ii) Integrated VR systems (6)
		BTL 4	Analyzing

10	List and explain about modeling toolkit features. (13)	BTL 3	Applying
11	How to explore the ideas for simulating physical behavior? Explain in detail. (13)	BTL 4	Analyzing
12	What is the purpose of Jack? Explain the key features of Jack. (13)	BTL 5	Evaluating
13	Explain in detail the features of superscape's VRT systems. (13)	BTL 1	Remembering
14	Write a short note on VR toolkits. (13)	BTL 6	Creating
15	How Sense8's Word tool kit is used to write program for developing and interacting virtual world? (13)	BTL 3	Applying
16	Explain with neat diagram to exhibit the relationship between the different actors and how they are charged with controlling a specific part of the virtual environments (13)	BTL 3	Applying
17	Examine in detail about Elastic collisions by direct impact of two particles and Oblique impact of two particles. (13)	BTL 4	Analyzing
PART C			
1	Explain in detail about the four human factors relevant to VR system. (15)	BTL 5	Evaluating

2	Explain in detail about
	    (i) The somatic senses (8)
	    (ii) Proprioceptive senses (7)
		BTL 6	Creating

3	What is meant by Equilibrium? Explain in detail about vestibular system with sensing Equilibrium through gravity and head rotation. (15)	BTL 5	Evaluating
4	Explain with example Virtual reality software tools used for VR Environment. (15)	BTL 6	Creating
5	Explain in detail on sensor hardware used for VR system. (15)	BTL 6	Creating
UNIT-V VR APPLICATION			
Virtual Reality Applications: Introduction – Engineering – Entertainment – Science Training – The Future: Introduction – Virtual environments – modes of interaction.			
PART A			

1	Express VE application in FEA	BTL 1	Remembering
2	Define Ergonomics	BTL 2	Understanding
3	How Jack used for inverse kinematics? justify	BTL 5	Evaluating
4	What is the role of ProVision100 VPX system?	BTL 1	Remembering
5	Tell the application of CADDS4X system?	BTL 2	Understanding
6	How gyro mechanism can be used in cyberTron?	BTL 4	Analyzing
7	Write the features of CADDS4X system?	BTL 4	Analyzing
8	How VSEL is used for submarine design?	BTL 5	Evaluating
9	Illustrate the role of illumination in Architecture application?	BTL 1	Remembering
10	How HRTF work to achieve acoustics properties in architectural design?	BTL 1	Remembering
11	List few VR system used for architectural design?	BTL 2	Understanding
12	Give the features of CWS system used for supermarket application.	BTL 3	Applying
13	What is the role of Jack in human factors modeling?	BTL 3	Applying
14	What is the purpose of Inverse kinematics in animation?	BTL 3	Applying
15	Write the use of collision avoidance property in human factor modeling	BTL 2	Understanding
16	Write the features incorporated into 3D cartoon character?	BTL 5	Evaluating
17	How to extract facial control parameters?	BTL 3	Applying
18	Give the example of Game systems	BTL 6	Creating
19	Define virtual sets	BTL 6	Creating
20	Write the application of MONA LISA in VR systems	BTL 1	Remembering
21	Give the example system and its feature to construct realistic	BTL 3	Applying

	simulation of biological system.		
22	Apply the functionalities of piriform cortex simulation.	BTL 3	Applying
23	Point out the aim of VR approach for molecular modeling?	BTL 4	Analyzing
24	Outline the use of VR system in virtual therapy?	BTL 5	Evaluating
PART-B			
1	Write down the application area of VR in engineering in the domain of Aero engine design and submarine design. (13)	BTL 2	Understanding
2	Explain in detail on the application of VR in Architecture and Human factor modeling. (13)	BTL 1	Remembering
3	Write the features of Jack for human factors modeling. (13)	BTL 3	Applying
4	Explain the following (i) Industrial concept design (8) (ii) Telecoms Engineering (5)	BTL 2	Understanding
5	Explain the role of computer animation in the application of entertainment. (13)	BTL 1	Remembering
6	Write the short notes on (i) TV Training and rehearsal environment (7) (ii) Games system (6)	BTL 4	Analyzing
7	Explain in detail on Visualization of (i) Electrical fields (5) (ii) Piriform cortex simulation (4) (iii) Complex spike in a cerebellar Purkinje cell (4)	BTL 5	Evaluating
8	Explain the application of VR for the following (i) Virtual therapy (7) (ii) Ultrasound echography (6)	BTL 6	Creating
9	Elaborate the application of VR system in the domain of training. (13)	BTL 1	Remembering
10	Write the short notes on (i) Colonoscopy (7) (ii) A Laparoscopic simulator (6)	BTL 1	Remembering
11	How CBT (Computer Based Technology) established for Military training? (13)	BTL 3	Applying
12	What is the role of accident simulator? Explain in detail. (13)	BTL 2	Understanding
13	Justify how VR system used for Medicine domain. (13)	BTL 4	Analyzing

14	Write the importance of mode of interaction in VR system. (13)	BTL 6	Creating
15	Classify the advantages of cockpits flight simulation. (13)	BTL 3	Applying
16	Illustrate the application of VR system in Training domain. (13)	BTL 3	Applying
17	Justify How virtual environments in future will continue to be used in all type of training activities. (13)	BTL 4	Analyzing

PART-C

1	Explain in various application domain of VR with respect to engineering. (15)	BTL 4	Analyzing
2	Express how VR system can be used for Entertainment. (15)	BTL 6	Creating
3	The training through simulation provides significant benefits over other method. Justify. (15)	BTL 4	Analyzing
4	How VR system used for Nuclear Industry. Explain with illustration. (15)	BTL 5	Evaluating
5	Explain the role of VR environment incorporates in future. (15)	BTL 5	Evaluating