SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

VII SEMESTER

1908005- VIRTUAL REALITY

Regulation – 2019

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE
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	Illustrate real time computer graphics.	BTL 2	Understanding
3	Write the concept of flight simulation and its significance in aviation training	BTL 2	Understanding
4	List out the advantages of Flight simulation.	BTL 2	Understanding
5	List the demerits of Flight simulation	BTL 1	Remembering
6	Point out on visual feedback.	BTL 1	Remembering
7	What is meant by immersion? Give an example.	BTL 1	Remembering
8	Illustrate the concept of interactive computer graphics with an example.	BTL 2	Understanding
9	Define Tactile feedback	BTL 1	Remembering
10	Write short note on acoustic feedback.	BTL 2	Understanding
11	List the basic requirements of a VR environment.	BTL 1	Remembering
12	What is meant by virtual database?	BTL 2	Understanding
13	How real-time images can be generated.	BTL 2	Understanding
14	Describe database interaction with a suitable example.	BTL 2	Understanding
15	What is meant by physical simulation.	BTL 2	Understanding
16	Define hybrid VR system.	BTL 1	Remembering
17	How to create perspective projection with respect to standard computer graphics.	BTL 2	Understanding
18	What is meant by 3D clipping?	BTL 1	Remembering
19	What is meant by extruding?	BTL 2	Understanding
20	Define Swept surface.	BTL 1	Remembering
21	What is called ambient light?	BTL 2	Understanding
22	Write the difference between aliasing and antialiasing.	BTL 1	Remembering

23	How texture mapping enables real world images to be incorporated into a computer graphics?	BTL 2	Understanding
24	Point out on Bump mapping.	BTL 1	Remembering

PART-B

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

PART – C

1	Explain in detail about color theory and color models used to represent colors.	BTL 6	Creating
2	Explain the domain under which VR can be used. what are the benefits of VR explain in detail?	BTL 5	Evaluating
3	How to increase realism using illumination model. Explain in detail.	BTL 6	Creating
4	Explain the following: (i) Texture Mapping (4) (ii) Bump Mapping (4) (iii) Environment Mapping (4) (iv) Stereographic images (3)	BTL 5	Evaluating
5	Explain in detail on stereo Perspective Projections with illustrative diagrams	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	State how the flight path of a projectile can be described?	BTL 1	Remembering
2	Write the function and use of a 3D digitizer.	BTL 2	Understanding
3	What is meant by frame of reference in VR system?	BTL 1	Remembering
4	Write the matrix representation for translation transformation	BTL 1	Remembering
5	What is meant by uniform scaling?	BTL 1	Remembering
6	Define fractals.	BTL 2	Understanding
7	What is meant by CSG?	BTL 1	Understanding
8	What is meant by procedural modeling?	BTL 1	Understanding
9	What is meant by direct cosines?	BTL 1	Remembering
10	List the benefits of using instances	BTL 2	Understanding
11	Interpret whether Catmull-Rom spline is interpolating or approximating.	BTL 2	Understanding
12	Define instances.	BTL 1	Remembering
13	What is meant by object picking in virtual reality ?	BTL 1	Remembering
14	State the purpose of Bezier surface patches.	BTL 1	Remembering
15	Which transformation is termed as a rigid body transformation and justify your answer?	BTL 2	Understanding
16	Write the purpose flying technique can be used?	BTL 2	Understanding
17	Write the need of collision detection in VR system	BTL 2	Understanding
18	What is meant by Min-max testing?	BTL 1	Remembering
19	Write down the static and dynamic features of VE	BTL 1	Remembering
20	List the physical constraints used to define dynamic objects.	BTL 1	Remembering
21	Define animation.	BTL 2	Understanding
22	What is the role of virtual light in VE?	BTL 2	Understanding
23	Point out on Teleporting.	BTL 1	Remembering
24	How gesture recognition can be carried out?	BTL 1	Remembering

PART-B

1	How to build 3D from 2D? Explain the techniques used to convert 2D to 3D.	BTL 3	Applying
2	Examine in detail on Bezier space curve.	BTL 4	Analyzing
3	How to define the curve with B-spline space curve	BTL 3	Applying
4	How spline curves are categorized? Explain the different types of space curves with illustrative diagram	BTL 5	Evaluating
5	Develop the various schemes for describing 3D surface boundaries	BTL 3	Applying

6	Assess a short note on: (i) Translation (4) (ii) Scaling (4) (iii) Rotation (5)	BTL 5	Evaluating
7	XYZ fixed angles described the angles of rotation? Explain in detail.	BTL 3	Applying
8	Elaborate on XYZ Euler angles of rotation. By applying roll, pitch and yaw.	BTL 5	Evaluating
9	Explain in detail on rotation about arbitrary axis with illustrative diagram.	BTL 4	Analyzing
10	Develop a short note on compound rotations with sequence of matrix operations.	BTL 3	Applying
11	Examine the following: (i) Object picking (7) (ii) Shape picking (7)	BTL 4	Analyzing
12	Examine about flying techniques used for moving around the virtual domain.	BTL 4	Analyzing
13	Construct a diagram to integrate various elements of a generic VR system	BTL 3	Applying
14	Organize a generic VR system with basic input, process and output unit.	BTL 3	Applying
15	Assess the transforms associated with scaling the VE with illustrative diagram.	BTL 5	Evaluating
16	Draw and Organize the diagram to illustrate the transforms associated with object picking.	BTL 3	Applying
17	Explain in detail note on radiosity that attempts to simulate the multiple diffuse reflection.	BTL 5	Evaluating
PART-C			
1	Explain in detail on modeling transformation with matrix representation.	BTL 6	Creating
2	Explain in detail about the purpose of computer environment in generic VR system.	BTL 5	Evaluating
3	Explain in detail on VR technology used to support VR task.	BTL 6	Creating
4	Explain about the different modes of interaction associated with VR technology.	BTL 5	Evaluating
5	Assess in detail about 3D boundary representation.	BTL 5	Evaluating

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

1	Explain the following:
	    (i) Linear and Nonlinear interpolation (7)
	    (ii) Parametric Interpolation (6)
		BTL 3	Applying

2	Build linear translation of animation of the objects with illustrative diagram.	BTL 3	Applying
3	Illustrate with example how FFD Free form Deformation techniques used for modeling?	BTL 6	Creating

4	Determine elastic collisions is achieved by direct impact of two particles and oblique impact of two particles.	BTL 5	Evaluating
5	Explain the following: (i) Shape inbetweening (5) (ii) Object inbetweening (4) (iii) Parametric line inbetweening (4)	BTL 5	Evaluating
6	Develop a note on Particle systems.	BTL 3	Applying
7	Discuss in detail about the techniques of steerable wheel.	BTL 6	Creating
8	Develop the motion of a projectile and collision with the ground in detail.	BTL 3	Applying
9	How to simulate simple pendulums behavior? Derive the acceleration and velocity of it.	BTL 4	Analyzing
10	Derive acceleration and velocity of spring motion by analyzing the dynamic forces acting upon the object.	BTL 4	Analyzing
11	Discuss the technique of elastic structures with diagram.	BTL 6	Creating
12	Construct a simple air craft model with neat diagram.	BTL 3	Applying
13	Build the separation of speed and angle influenced by the coefficient of restitution.	BTL 3	Applying
14	Formulate the following : (i) Linear angular rotation (7) (ii) Non linear angular rotation (6)	BTL 6	Creating
15	Estimate the time t_g to collide with the ground for an object falling in a gravitational field.	BTL 6	Creating
16	Develop a techniques on flight dynamics of an air craft.	BTL 3	Applying
17	Develop a nonlinear translation of animation of the objects with illustrative diagram.	BTL 3	Applying

PART-C

1	Explain in detail on Shape and object inbetweening with example.	BTL 6	Evaluating
2	Explain in detail about the animation of objects with linear and non linear translation.	BTL 5	Evaluating
3	Explain how free form deformation techniques applied to a 1D set of ordinates,2D shapes and 3D objects?	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 1	Remembering
2	List the human factors relevant to VR systems	BTL 1	Remembering
3	Summarize the function of actor concepts in a virtual reality system.	BTL 2	Understanding
4	Compare the refractive power of optical system and human eye.	BTL 2	Understanding
5	State the use of the ossicular system.	BTL 1	Remembering
6	Define accommodation.	BTL 1	Remembering
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	List the objective of dVS .	BTL 1	Remembering
12	Define sound intensity.	BTL 2	Understanding
13	What is meant by HRTF?	BTL 2	Understanding
14	State how HRTF is measured.	BTL 1	Remembering
15	Define Ambisonics techniques.	BTL 1	Remembering
16	State the purpose of somatic senses.	BTL 1	Remembering
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 deep sensations are applied in virtual reality systems?	BTL 2	Understanding
21	What is the use of bio mouse?	BTL 2	Understanding
22	State the application of PowerStick.	BTL 1	Remembering
23	Mention the use of VIM HMD.	BTL 1	Remembering
24	What is meant by Convolvotron?	BTL 2	Understanding

PART-B

1	Draw the neat diagram and organize about Brodmann's mapping of the somatic sensory area of the cortex.	BTL 3	Applying
2	Model the diagrammatic cross section of the human eye and explain in detail.	BTL 3	Applying
3	Design about outer ear, middle ear and inner ear of human ear with neat diagram.	BTL 6	Creating
4	Assess in detail about sound perception.	BTL 5	Evaluating
5	Inference about the head related transfer function.	BTL 4	Analyzing

6	Formulate the following:
	   (i) Coupling between the vestibular and visual system(7)
	   (ii) Sensing linear acceleration (6)
		BTL 6	Creating

7	Design and Develop a note on VR hardware with illustration.	BTL 6	Creating

8	Examine the function of the following:
	    (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.	BTL 3	Applying
11	How to explore the ideas for simulating physical behavior? Explain in detail.	BTL 4	Analyzing
12	What is the purpose of Jack? Explain the key features of Jack.	BTL 5	Evaluating
13	Examine the features of superscape's VRT systems.	BTL 4	Analyzing
14	Develop a short note on VR toolkits.	BTL 3	Applying
15	How Sense8's Word tool kit is used to write program for developing and interacting virtual world?	BTL 6	Creating
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.	BTL 5	Evaluating
17	Elaborate in detail about Elastic collisions by direct impact of two particles and Oblique impact of two particles.	BTL 6	Creating

PART C

1	Explain in detail about the four human factors relevant to VR system.	BTL 5	Evaluating

2	Compare the following :
	    (i) The somatic senses(8)
	    (ii) Proprioceptive senses (7)
		BTL 4	Analyzing

3	What is meant by Equilibrium? Explain in detail about vestibular system with sensing Equilibrium through gravity and head rotation.	BTL 5	Evaluating
4	Explain with example Virtual reality software tools used for VR Environment	BTL 6	Creating
5	Explain in detail on sensor hardware used for VR system	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	State how Jack is used for inverse kinematics.	BTL 1	Remembering
4	What is the role of ProVision100 VPX system ?	BTL 1	Remembering
5	List the features of the CADDS4X system.	BTL 1	Remembering

6	How the gyro mechanism can be used in CyberTron. ?	BTL 2	Understanding
7	How VSEL is used for submarine design?	BTL 2	Understanding
8	Explain how VSEL is used for submarine design.	BTL 2	Understanding
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	List the features of the CWS system used for supermarket applications.	BTL 1	Remembering
13	State the role of Jack in human factors modeling.	BTL 1	Remembering
14	Explain the purpose of inverse kinematics in animation.	BTL 2	Understanding
15	Write the use of collision avoidance property in human factor modeling.	BTL 2	Understanding
16	List the features incorporated into a 3D cartoon character.	BTL 1	Remembering
17	How to extract facial control parameters?	BTL 2	Understanding
18	Give the example of Game systems.	BTL 2	Understanding
19	Define virtual sets.	BTL 1	Remembering
20	Write the application of MONA LISA in VR systems.	BTL 1	Remembering
21	Give the example system and its feature to construct realistic simulation of biological system.	BTL 1	Remembering
22	Write the functionalities of piriform cortex simulation.	BTL 2	Understanding
23	What is the aim of VR approach for molecular modeling?	BTL 1	Remembering
24	Write the use of VR system in virtual therapy.	BTL 2	Understanding

PART-B

1	Discuss the application area of VR in engineering in the domain of Aero engine design and submarine design.	BTL 6	Creating
2	Explain in detail on the application of VR in Architecture and Human factor modeling.	BTL 5	Evaluating
3	Develop the features of Jack for human factors modeling.	BTL 3	Applying
4	Discuss the following: (i) Industrial concept design (8) (ii) Telecoms Engineering (5)	BTL 6	Creating
5	Influence the role of computer animation in the application of entertainment.	BTL 4	Analyzing
6	Elaborate the following: (i) TV Training and rehearsal environment. (ii) Games system.	BTL 6	Creating
7	Explain the following 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.	BTL 6	Creating
10	Conclude the application of the following; (i) Colonoscopy (7) (ii) A Laparoscopic simulator (6)	BTL 5	Evaluating
11	How CBT (Computer Based Technology) established for Military training?	BTL 3	Applying
12	Analyze the function of accident simulator? Explain in detail.	BTL 4	Analyzing
13	Justify how VR system used for Medicine domain,.	BTL 4	Analyzing
14	Write the importance of mode of interaction in VR system	BTL 6	Creating
15	Categorize the advantages of cockpits flight simulation.	BTL 4	Analyzing
16	Explain the application of VR system in Training domain.	BTL 3	Applying
17	Justify How virtual environments in future will continue to be used in all type of training activities.	BTL 5	Evaluating

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