

3D DESIGN AND ANIMATION
(Skill Course)
I Year B. Tech. I Semester
(Common to CSE, CSM, CSD, CSC, CSF, IT)

Course Code:

L T P C

0 0 2 1

CO1: Apply Blender tools and techniques to create 3D models. (L3)

CO2: Implement materials, textures, lighting, and rendering to develop 3D scenes. (L3)

CO3: Demonstrate keyframes, curves, and constraints in 3D animation. (L3)

CO4: Use modifiers, textures, and rendering techniques to create realistic 3D objects. (L3)

CO5: Construct low-poly game environments and rigged 3D models. (L3)

LIST OF PROGRAMS

(Any 12 programs must be completed)

1. Explore the Blender Environment

- Blender interface and workspace
- 3D Viewport navigation and scene management
- Object selection and transformation
- Project creation and file management

2. Construct Basic 3D Models

- Mesh primitives and object manipulation
- Object Mode and Edit Mode
- Vertex, edge, and face operations
- Basic mesh transformations

3. Animate Objects using Keyframes

- Keyframe creation and editing
- Location, rotation, and scale animation
- Animation timeline
- Interpolation and motion control

4. Design 3D Models using Mesh Techniques

- Extrusion and inset operations
- Loop cuts and edge manipulation
- Bevel and knife operations
- Mesh refinement techniques

5. Configure Lighting, Camera, and Rendering

- Light types and illumination
- Camera positioning and composition
- Scene lighting
- Render settings and output

6. Create Models using Curves and Text

- Curve creation and editing
- Text objects and 3D typography
- Conversion of curves and text into meshes
- Object transformation and customization

7. Configure Materials and Shading

- Material creation and assignment
- Surface properties and shader parameters
- Metallic, roughness, and transparency effects
- Basic shader-node configuration

8. Develop Symmetrical and Detailed Models

- Proportional editing
- Mirror-based modelling
- Surface refinement
- Non-destructive modelling workflow

9. Implement Modifiers for 3D Modeling

- Mesh and deformation modifiers
- Array and Mirror operations
- Boolean and Bevel operations
- Solidify and Subdivision Surface techniques

10. Produce Realistic 3D Models

- Detailed mesh construction
- Realistic material creation
- Texture and surface detailing
- Lighting and rendering of realistic objects

11. Apply UV Mapping and Textures

- UV unwrapping
- Texture coordinates
- Image-based texturing
- Texture mapping and surface enhancement

12. Develop Low-Poly 3D Assets

- Low-poly modelling principles
- Polygon optimization
- Game-ready asset creation
- Materials and basic texturing

13. Refine Animation using F-Curves

- Graph Editor
- F-Curve manipulation
- Timing and interpolation
- Smooth motion and animation control

14. Implement Path Animation and Constraints

- Motion paths and curve-based movement
- Follow Path constraints
- Tracking and orientation
- Camera path animation

15. Construct Rigged Models and Animations

- Armature and bone creation
- Bone hierarchy
- Skinning and Armature Modifier
- Posing and basic character animation

16. Integrate a Low-Poly Game Environment

- Environment layout and scene composition
- Game asset modelling
- Materials, textures, and lighting
- Basic environmental animation
- Final scene rendering

Case Studies:

Case Study 1: 3D Product Modeling and Visualization

(Develop a complete 3D product model and produce a realistic rendered presentation)

Related Activities:

- Explore Blender's workspace and scene organization.
- Construct the product using basic and advanced mesh modelling techniques.
- Utilize curves, text, extrusion, proportional editing, and symmetrical modelling.
- Implement suitable modifiers for efficient model development.
- Configure materials, shaders, UV mapping, and textures.
- Set up camera and lighting for product visualization.
- Produce a final realistic render of the product.)

Suggested Applications: Smart speaker, mobile phone, table lamp, coffee mug, or gaming controller.

Case Study 2: Animated 3D Character and Motion Scene

(Develop a simple 3D character or object and create a short animated sequence.)

Related Activities:

- Construct and refine a 3D character or animated object.
- Apply materials and textures to the model.
- Create an armature and establish a basic bone hierarchy.
- Configure the model for rigging and posing.
- Create keyframe-based movements.
- Refine motion using F-Curves and the Graph Editor.
- Implement path-based movement and constraints.
- Configure camera movement and scene lighting.
- Render the completed animation.)

Suggested Applications: Walking character, robotic arm, animated vehicle, flying object, or simple game character.

Case Study 3: Low-Poly 3D Game Environment

(Design and present a complete low-poly environment suitable for a basic game scene.

Related Activities:

- Plan and construct the environment layout.
- Develop low-poly buildings, terrain, roads, trees, vehicles, and other assets.
- Apply modelling techniques and modifiers to optimize the assets.
- Configure materials, UV mapping, and textures.
- Arrange lighting and cameras to establish the scene.
- Introduce simple animated elements such as moving vehicles or environmental objects.
- Integrate the individual assets into a complete game environment.
- Produce a final rendered scene or animation.)

Suggested Applications: Village, city street, campus, racing track, sci-fi environment, or adventure landscape.