

FACULTY OF COMPUTER APPLICATIONS
B.Sc.(IT) (Animation, Vfx and Game Design)

- **Sem** : 4
- **Subject Code** : 05BA0402
- **Subject** : 3D Rigging

- **Course Objectives** : Students will be able:
 1. Understand the principles of character rigging and deformation.
 2. Learn the tools and workflows in Maya for building animation-ready rigs.
 3. Create functional biped and quadruped character rigs with controllers.
 4. Apply skinning and weight painting techniques for realistic deformation.
 5. Develop clean, production-friendly rigs for use in animation pipelines.

- **Prerequisites** : Basic understanding of 3D modeling and Maya interface.

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PRACTICALS

Unit No	Topics Covered	No of lectures required
1	Introduction to Character Rigging <ul style="list-style-type: none"> ▪ Purpose, pipeline, and rig types. ▪ Joint Tool & Joint Hierarchy – Creating skeletons for bipeds. ▪ Joint Orientation & Naming Conventions – Clean rigging practice. ▪ Controllers Creation – NURBS controls for animators. ▪ Rigging Interface & Outliner Management 	30
2	IK and FK Systems <ul style="list-style-type: none"> ▪ Setting up inverse and forward kinematics for limbs. ▪ IK/FK Switching – Setup for seamless animation blending. ▪ Stretchy Limbs – Using expressions and nodes for dynamic stretching. ▪ Spine Rigging – Ribbon spine setup and control hierarchy. ▪ Head and Neck Rigging – Joint setup and control connections. 	30
3	Hand and Finger Rigging <ul style="list-style-type: none"> ▪ Custom attributes and driven keys. ▪ Foot Roll & Leg Rigging – Foot pivot setup with heel, 	30

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	<p>toe, and ball lift.</p> <ul style="list-style-type: none"> ▪ Facial Rig Basics – Joint-based and blend shape-based setups. ▪ Constraints & Set Driven Keys – Automating secondary controls. ▪ Skinning Preparation – Freezing, transformations, clean mesh checks. 	
4	<p>Skin Binding Techniques</p> <ul style="list-style-type: none"> ▪ Smooth Bind, Geodesic Voxel Bind. ▪ Weight Painting – Refining deformation across the mesh. ▪ Painting Weights for Elbows, Shoulders, Knees – Natural movement. ▪ Creating Animator-Friendly UI – Pick-walk, space switching, custom attributes. ▪ Final Project – Fully rigged biped character with clean controls and deformation. 	30

Course Outcomes:

1. Students will create and organize joint structures for character rigs.
2. Students will build IK/FK-based rigs with custom controls.
3. Students will implement facial, hand, and foot control systems.
4. Students will apply effective skinning techniques for clean deformation.
5. Students will complete a polished character rig ready for production use.

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Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	M	-	-	H	-	L	-	L	H	M	-
CO2	-	M	H	-	-	-	M	-	L	-	H
CO3	-	-	M	-	H	H	-	-	-	L	M
CO4	L	H	-	M	-	-	H	-	M	-	-
CO5	H	-	L	-	M	-	-	H	-	H	L

Text Book:

1. Learning Autodesk Maya 2024: Rigging 2024 by Autodesk Official Press

Reference Books:

1. Rig it Right! Maya Animation Rigging Concepts by Tina O’Hailey 2018 by Focal Press
2. Stop Staring: Facial Modeling and Animation Done Right by Jason Osipa 2010 by Sybex

Web Reference:

1. <https://area.autodesk.com>
2. <https://www.riggingdojo.com>
3. YouTube: Academic Phoenix Plus, Josh Sobel, Stylus Production

App Reference:

1. Maya Bonus Tools – Extra rigging utilities
2. AnimBot (Optional Plugin) – For advanced rigging/animation workflows

Syllabus Coverage from text /reference book & web/app reference:

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Unit	Chapter Numbers
1	Book 1 – Ch. 1-2 (Skeleton Setup, Naming, Controls)
2	Book 1 – Ch. 3-4 (IK/FK, Spine, Arms, Legs)
3	Book 1 + Osipa (Facial, Hands, Feet, Expressions)
4	Book 1 – Ch. 5-6 + NgSkinTools Docs (Skinning, Weight Painting, Final Rig)