Syllabus for Computational Modeller

Course Name	COMPUTATIONAL MODELLER
Sector	MEDIA & ENTERTAINMENT
Course Code	MAE/2023/COMO/226
Level	4
Occupation	(Type of Designation in which trainees are expected to get job opportunity)
Job Description	(Type of work that trainees are expected to do after completion of course).
Course Duration	Total Duration 450 Hrs (T-115, P-215, OJT-60 and ES-60)
Trainees' Entry Qualification	12th grade pass OR Completed 2nd year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass plus 2-year NTC in Mason Trade OR 10th grade pass and pursuing continuous schooling OR 10th Grade Pass with 2 yrs relevant experience OR Previous relevant Qualification of Level 3.0 or equivalent with minimum education as 8th Grade pass OR Previous relevant Qualification of Level 3.5 or Equivalent
Trainers Qualification	DIPLOMA/GRADUATE IN MULTIMEDIA & ANIMATION/ AMT, HS WITH CERTIFICATE COURSE IN MULTIMEDIA & ANIMATION 3 YEARS FOR DIPLOMA, GRADUATE/ 5 YRS FOR HS

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
1	Computer-based Animation & Introduction to 3d Software	Apply elements in the software interfaces.	15	15	30
2	Anatomies, 2D Splines & Shapes	Use Splines, Shapes & Compound Objects.	10	20	30
3	Introduction to 3DModelling	Demonstrate Polygon modeling and Tracking in their work.	10	20	30
4	Key frame Animation	Implement Key frames, modifiers & Complex Controllers	10	20	30
5	Simulation & Effects	Implement Gravity, wind, fur, hair and cloth in their	20	40	60

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
		projects			
6	Lighting & Camera	Demonstrate the appropriate lighting and camera techniques for a specific work project.	20	40	60
7	Texturing with Max	Apply various texturing methods in their work.	20	40	60
8	Rendering with V-Ray	Execute various options while rendering and give the optimum render.	10	20	30
9.	OJT	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).		60	60
10.	Employability Skill	As per guided curriculum	60	--	60
		TOTAL:	175	275	450

SYLLABUS:

Module No. 1: Computer-based Animation &Getting Started with 3d Softwares

Outcome- Apply elements in the software interfaces**.**

Theory Content:

1.1 Introduction to the Media and Entertainment
1.2 Duties and responsibilities of Modeller
1.3 Definition of Computer-based Animation,
Basic Types of Animation: Real Time, Non-real-time, Definition of Modelling,
Creation of 3D objects.

Practical Content:

1.4 Exploring the Blender /Max Interface,
1.5 Controlling & Configuring the Viewports,
1.6 Customizing the Max Interface & Setting Preferences,
1.7 Working with Files, Importing & Exporting,
1.8 Selecting Objects & Setting Object Properties,
1.9 Duplicating Objects, Creating & Editing Standard Primitive & extended Primitives objects, Unit 1.10 Transforming objects, Pivoting, aligning etc.

Tools & Equipment needed :

A Desktop, Blender, 3Ds Max

Module No. 2: Anatomies, 2D Splines & Shapes

Outcome- Use Splines, Shapes & Compound Objects

Theory Content:

2.1 Fundamental and Principles of Animation and Modeling
2.2 Life Drawings: Human Anatomy Fundamentals
2.3 Animation Production Process
2.4 Create Hookup Poses and Animation

Practical Content:

2.5 Understand 2D Splines& shape,
2.6 Extrude & Bevel 2D object to 3D,
2.7 Understanding Loft & terrain,
2.8 Modeling simple 4 objects with splines,
2.9 Understanding morph, scatter, conform, connect compound objects,
2.10 Blobmesh, Boolean ,Proboolean & procutter compound object

Tools & Equipment needed:

A Desktop, Blender, 3Ds Max, Maya

Module No. 3: Introduction to 3DModelling

Outcome- Demonstrate Polygon modeling and Tracking in their work.

Theory Content:

3.1-About use of Polygons, Graphite, XRefs, Tracking

Practical Content:

3.2 Modeling with Polygons,
3.3 using the graphite,
3.4 working with XRefs,
3.5 Building simple scenes,
3.6 Building complex scenes with XRefs,
3.7 using assets tracking, deforming surfaces & using the mesh modifiers,
3.8 modeling with patches & NURBS

Tools & Equipment needed:

A Desktop, Blender, 3Ds Max, Maya

Module No. 4: Key frame Animation

Outcome- Implement Key frames, modifiers & Complex Controllers

Theory Content:

4.1 The 3d animation pipeline,
4.2 Introduction to Key frames, Modifiers & complex controllers.

Practical Content:

4.3 Creating Key frames, Auto Key frames,
4.4 Move & Scale Key frame on the timeline,
4.5 Animating with constraints & simple controllers,
4.6 Animation Modifiers & complex controllers,
4.7 Function curves in the track view, motion mixer etc.

Tools & Equipment needed:
A Desktop, Blender, 3Ds Max, Maya

Module No. 5: Simulation & Effects

Outcome- Implement Gravity, wind, fur, hair and cloth in their projects

Theory Content:
5.1 Concept of space warp object,
5.2 Theory on Gravity, wind, displace force object,
5.3 Concept on deflectors, FFD space warp, wave, ripple, bomb
5.4 Concept of particle system and how it works
5.5 Concept on Hair, Cloth, Fur modifiers

Practical Content:
5.6 Bind to Space Warp object,
5.7 Gravity, wind, displace force object,
5.8 Deflectors, FFD space warp, wave, ripple, bomb,
5.9 Creating particle system through parray, understanding particle flow user interface,
5.10 How to particle flow works, hair & fur modifier, cloth & garment maker modifiers etc

Tools & Equipment needed:
A Desktop, Blender, 3Ds Max, Maya

Module No. 6: Lighting & Camera

Outcome- Demonstrate the appropriate lighting and camera techniques for a specific work project.
Theory Content:
6.1 Introduction to Camera, Camera motion blur & Depth of field
6.2 Concept of camera tracking
6.3 Concept of lighting techniques, light tracing
6.4 Concept of Radiosity, video post, mental ray lighting

Practical Content:
6.5 Configuring & Aiming Cameras, camera motion blur, camera depth of field,
6.6 camera tracking,
6.7 using basic lights & lighting Techniques,
6.8 working with advanced lighting, Light Tracing,
6.9 Radiosity, video post, mental ray lighting etc.

Tools & Equipment needed:
A Desktop, Blender, 3Ds Max,Maya

Module No. 7: Texturing with Max

Outcome- Apply various texturing methods in their work.

Theory Content:
7.1 Concept of material editor
7.2 Concept of textures
7.3 Concept of compound materials

7.4 Concept of atmospheric & render effects

Practical Content:
7.5 Using the material editor & the material explorer,
7.6 creating & applying standard materials, adding material details with maps,
7.7 creating compound materials & material modifiers,
7.8 unwrapping UVs & mapping texture,
7.9 using atmospheric & render effects etc.

Tools & Equipment needed:
A Desktop, Blender, 3Ds Max, Maya

Module No. 8: Rendering with V-Ray

Outcome- Execute various options while rendering and give the optimum render.

Theory Content:
8.1 Concept of VRay
8.2 Concept of HDRI Illumination

Practical Content:
8.3 V-ray light setup,
8.4 V-ray rendering settings,
8.5 HDRI Illumination,
8.6 Fine-tuning shadows, Final render setting etc.

Tools & Equipment needed:
A Desktop, Blender, 3Ds Max, Maya

Module No. 9: OJT

Outcome: Work in real job situation with special emphasis on basic safety and hazards in this domain

Practical Content:

Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for **60 Hours.**)

Module No. 10: Employability Skills **(60 Hrs)**

Key Learning Outcomes

Introduction to Employability Skills Duration: 1.5 Hours

After completing this programme, participants will be able to:
1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

Basic English Skills Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e -mail using basic English

Career Development & Goal Setting Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy Duration:5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely

19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely

23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

Customer Service Duration: 5 Hours

30. Describe the significance of analyzing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a professional manner.
32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for apprenticeship & Jobs Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
35. Discuss the significance of maintaining hygiene and confidence during an interview
36. Perform a mock interview
37. List the steps for searching and registering for apprenticeship opportunities

Learning Outcome – Assessment Criteria

Module No.	Outcome	Assessment Criteria
1	Apply elements in the software interfaces.	**After completion of this module students will be able to:** 1.1 Customize the Max Interface & Setting Preferences 1.2 Work with Files, Importing & Exporting 1.3 Identify and Select Objects & Setting Object Properties 1.4 Create & Edit Standard Primitive & extended Primitives objects 1.5 Transform objects, Pivoting, aligning
2	Use Splines, Shapes & Compound Objects.	**After completion of this module students will be able to:** 2.1 Explain 2D Splines& shape 2.2 Extrude & Bevel 2D object to 3D 2.3 Model simple 4 objects with splines 2.4 Explain morph, scatter, conform, connect compound objects 2.5 Demonstrate Blobmesh, Boolean, Proboolean &

Module No.	Outcome	Assessment Criteria
		pro cutter compound object.
3	Demonstrate Polygon modeling and Tracking in their work.	**After completion of this module students will be able to:** 3.1 Model with Polygons 3.2 work with XRefs 3.3 Build simple scenes 3.4 Build complex scenes with XRefs 3.5 model with patches & NURBS
4	Implement Key frames, modifiers & Complex Controllers	**After completion of this module students will be able to:** 4.1 Create Key frames, Auto Key frames 4.2 Move & Scale Key frame on the timeline 4.3 Animate with constraints & simple controllers 4.4 animate with Modifiers & complex controllers 4.5 Use function curves in the track view, motion mixer
5	Implement Gravity, wind, fur, hair and cloth in their projects	**After completion of this module students will be able to:** 5.1 Bind to Space Warp object 5.2 Use Gravity, wind, displace force object 5.3 Use Deflectors, FFD space warp, wave, ripple, bomb 5.4 Create particle system through parray 5.5 Explain how particle flow works, hair & fur modifier, cloth & garment maker modifiers
6	Demonstrate the appropriate lighting and camera techniques for a specific work project.	**After completion of this module students will be able to:** 6.1 Configure & Aim Cameras 6.2 Determine camera motion blur, camera depth of field 6.3 Use camera tracking 6.4 Use basic lights & lighting Techniques 6.5 Work with advanced lighting, Light Tracing
7	Apply various texturing methods in their work.	**After completion of this module students will be able to:** 7.1 Use the material editor & the material explorer 7.2 Create & apply standard materials, adding material details with maps 7.3 Create compound materials & material modifiers 7.4 unwrap UVs & mapping texture 7.5 use atmospheric & render effects
8	Execute various options while rendering and give the optimum render.	**After completion of this module students will be able to:** 8.1 Use V-ray light setup 8.2 Determine V-ray rendering settings 8.3 Use HDRI Illumination 8.4 Fine-tuning shadows 8.5 Final render setting
4	OJT	Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for 60 Hours.)

Module No.	Outcome	Assessment Criteria
5	Employability Skill	**As per guided curriculum**

List of Tools, Equipment & materials needed for 30 Trainees (Practical) on twin sharing basis

Sl No	Items Name	Specification	Qty
1	Desktop computer	64-bit Intel® or AMD® multi-core processor with SSE4.2 instruction set Apple Mac models with M series chip are supported under Rosetta 2 mode, 8 GB of RAM (16 GB or more recommended), 6 GB of free disk space for install, Three-button mouse	15
2	Blender software	NA	15
3	Autodesk 3ds Max	NA	15
4	Autodesk Maya	NA	15

Marks Distribution

Outcome	Outcome Code	Total Th Marks	Total Pr Marks
Apply elements in the software interfaces.	MAE/2704/OC1	20	60
Use Splines, Shapes & Compound Objects.	MAE/2704/OC2	10	70
Demonstrate Polygon modeling and Tracking in their work.	MAE/2704/OC3	10	70
Implement Key frames, modifiers & Complex Controllers	MAE/2704/OC4	10	70
Implement Gravity, wind, fur, hair and cloth in their projects	MAE/2704/OC5	30	100
Demonstrate the appropriate lighting and camera techniques for a specific work project.	MAE/2704/OC6	30	100

Apply various texturing methods in their work.	MAE/2704/OC7	30	100
Execute various options while rendering and give the optimum render.	MAE/2704/OC8	10	80
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	MAE/2704/OC9	0	150
Employability Skill-60 Hrs	DGT/VSQ/N0102	50	0