



MANGALORE UNIVERSITY

STATE EDUCATION POLICY - 2026 (SEP-2026)

Curriculum Structures for

Bachelor of Science

Animation and Visual Effects Degree Programme

**Syllabus for V and VI Semesters and
Elective Courses in Animation and Visual Effects**

Board of Studies in Computer Science

Mangalore University

Konaje

MANGALORE UNIVERSITY

Suggested programme structure for the Under Graduate Programme

[BSc. Food Nutrition & Dietetics, Food Technology, Interior Design & Decoration,
Animation & Visual Effect, Home Science]

Programme Structure

[illegible]

BSc – Animation and Visual Effects

Semester V								
SN	Course Code	Course Name	Category of Course	Teaching Hours per week	SEE	IA	Total Marks	Credits
1		Video Compositing	Theory	3	80	20	100	3
		Video compositing Lab	Practical	4	40	10	50	2
2		Dynamics	Theory	3	80	20	100	3
		Dynamics Lab	Practical	4	40	10	50	2
3		Motion Graphics Design	Theory	3	80	20	100	3
		Motion graphics Lab	Practical	4	40	10	50	2
4		Ad Film Making	Theory	3	80	20	100	3
5		Digital Compositing	Theory	3	80	20	100	3
6		Advanced CGI I	Theory	3	80	20	100	3
7		Virtual Reality	Practical	2	40	10	50	2
Semester VI								
SN	Course Code	Course Name	Category of Course	Teaching Hours per week	SEE	IA	Total Marks	Credits
1		Advanced Character Animation	Theory	3	80	20	100	3
		3D Character Animation Lab	Practical	4	40	10	50	2
2		Psychology of Animation	Theory	3	80	20	100	3
		Motion Graphic in 3D Lab	Practical	4	40	10	50	2
3		Introduction to Zbrush	Theory	3	80	20	100	3
		Zbrush Fundamentals Lab	Practical	4	40	10	50	2
4		The Future of Animation and VFX	Theory	3	80	20	100	3
5		The Business of Animation and VFX	Theory	3	80	20	100	3
6		Animation & VFX in Gaming	Theory	3	80	20	100	3
7		Animation Short Film Project (Mini Project)	Practical	2	40	10	50	2

BSc – Animation and Visual Effects

Semester I			
SN	Course Code	Course Name	Credits
1	DSC-1	Fundamentals of Drawing	3
2	DSC-2	Traditional and Stop Motion Animation	3
3	DSC-3	Basics of Graphic Design	3
4	DSP-1	Fundamental of Art lab	2
5	DSP-2	Traditional and Stop motion Animation lab	2
6	DSP-3	Raster graphic lab (Photoshop)	2
7		Language 1	3
8		Language 2	3
9		Compulsory 1	2

Semester II			
SN	Course Code	Course Name	Credits
1	DSC-4	Storyboard and Advanced Drawing	3
2	DSC-5	2D Digital Animation	3
3	DSC-6	Advances in Graphic Design	3
4	DSP-4	Storyboard and Advance drawing Lab	2
5	DSP-5	2D Digital Animation Lab	2
6	DSP-6	Vector Graphics Lab	2
7		Language 1	3
8		Language 2	3
9		Compulsory 2	2

Semester III			
SN	Course Code	Course Name	Credits
1	DSC-7	3D Modelling	3
2	DSC-8	Rigging & Animation	3
3	DSC-9	Aesthetics of Video Editing	3
4	DSP-7	3D Modeling Lab	2
5	DSP-8	Rigging & Animation Lab	2
6	DSP-9	Video Editing Lab	2
7	DSE-1	User Interface Design	2
7		Language 1	3
8		Language 2	3

Semester IV			
SN	Course Code	Course Name	Credits
1	DSC-10	Audio Production	3
2	DSC-11	Surfacing & Lighting	3
3	DSC-12	Introduction To Blender	3
4	DSP-10	Audio Production Lab	2
5	DSP-11	Surface Lighting Lab	2
6	DSP-12	Fundamental Blender Lab	2
7	DSE-2	Film Direction	2
9		Language 1	3
10		Language 2	3
11	Compulsory 3	Web design	2

Semester V			
SN	Course Code	Course Name	Credits
1	DSC-13	Video Compositing	3
2	DSC-14	Dynamics	3
3	DSC-15	Motion Graphics Design	3
4	DSC-16	Ad Film Making	3
5	DSC-17	Digital Compositing	3
6	DSC-18	Advanced CGI I	3
9	DSP-13	Video compositing Lab	2
10	DSP-14	Dynamics Lab	2
11	DSP-15	Motion graphics Lab	2
12	Compulsory 4	Virtual Reality	2

Semester VI			
SN	Course Code	Course Name	Credits
1	DSC-19	Advanced Character Animation	3
2	DSC-20	Psychology of Animation	3
3	DSC-21	Introduction to Zbrush	3
4	DSC-22	The Future of Animation and VFX	3
5	DSC-23	The Business of Animation and VFX	3
6	DSC-24	Animation & VFX in Gaming	3
9	DSP-16	3D Character Animation Lab	2
10	DSP-17	Motion Graphic in 3D Lab	2
11	DSP-18	Zbrush Fundamentals Lab	2
12	Compulsory 5	Animation Short Film Project (Mini Project)	2

SEMESTER V

BSc – Animation and Visual Effects	
Semester V	
Course Code: DSC-13	Course Name: Video Compositing
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To introduce students to the concepts of video compositing in post-production. - To familiarize students with industry-standard compositing software including Adobe After Effects, Nuke, and Blackmagic Fusion. - To develop skills in basic and advanced compositing techniques including keying, masking, and tracking. - To enable students to integrate 3D elements with live-action footage using compositing tools. - To teach matte painting, colour grading, and digital set extension techniques for cinematic storytelling.	
Course Outcome: - Navigate and operate industry-standard compositing software such as Adobe After Effects, Nuke, and Blackmagic Fusion. - Apply basic and advanced compositing techniques including keying, masking, tracking, and blending modes. - Integrate 3D elements into live-action footage and perform camera tracking and match moving. - Create digital matte paintings and apply professional colour grading for cinematic visual storytelling.	
Content	
Unit - 1	
Introduction to Video Compositing, video compositing and its importance in post-production, Understanding the history and evolution of compositing in film and TV, Working with Compositing Software, Overview of popular compositing software (e.g., Adobe After Effects, Nuke, Blackmagic Fusion), Interface navigation and project setup, Importing and managing media assets.	09

Unit – 2	
Basic and Advanced Compositing Techniques - Understanding layers and compositions, Working with keyframes and animation, Creating simple visual effects (e.g., text animation, basic motion graphics), Key concepts: Alpha channel, layers, masking, and blending modes, Advanced Compositing Techniques, Green screen (chroma key) compositing.	10
Unit – 3	
Rotoscoping, Tracking & 3D Integration-Introduction to Rotoscope, Rotoscoping and masking for complex object isolation, Tracking and match moving for integrating elements into live-action footage, Introduction to 3D space within compositing software, Integrating 3D elements into live-action footage, Basic 3D camera movement and animation	10
Unit – 4	
Matte Painting & Colour Management- Matte Painting and Digital Set Extensions, Creating virtual environments and extending physical sets using matte painting, Photorealistic set extensions and digital environments. Importance of digital matte painting in modern filmmaking. Understanding colour spaces and colour management, Colour correction for seamless integration, Creative colour grading for visual storytelling.	10
Reference Books: 1. Digital Compositing for Film and Video Hardcover – Steve Wright, 4th Edition, 2010. 2. Professional Digital Compositing: Essential Tools and Techniques – Lee Lanier. 3. The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures – Jeffrey A. Okun & Susan Zwerman. 4. Adobe After Effects Classroom in a Book – Adobe Creative Team, Adobe Press.	

Course Code: DSP-13 Lab	Paper Title: Video compositing Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 3 Hours
Practical List The following activities are to be carried out in the lab during the semester: 1. Introduction to Nuke 2. Basic Composite 3. Colour Correction 4. 2D Tracking 5. 3D Tracking 6. Keying 7. Camera Tracking 8. 3D Compositing 9. Warping 10. Stereoscopy Compositing 11. Transformation 12. Paint 13. Camera Projection 14. Warping & Morphing 15. Rotoscoping 16. Gizmo	
Reference Books: 1. Sze Chianly / Samantha Goh, Digital Compositing with Nuke 101 – Fatbars Limited, 2010. 2. Ganbar R, NUKE 101: Professional Compositing and Visual Effects – 2011. 3. The VES Handbook of Visual Effects – Jeffrey A. Okun & Susan Zwerman. 4. Steve Wright, Compositing Visual Effects, 2nd Edition – Focal Press, 2011.	

Course Code: DSC-14	Course Name: Dynamics
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To introduce students to the principles of dynamics and simulation in animation. - To familiarize students with Maya's particle system, fluid containers, and field tools. - To enable students to simulate cloth, hair, and rigid body dynamics using nCloth and nParticles. - To teach the creation of complex dynamic effects such as fire, smoke, explosions, and liquid simulation. - To provide students with an understanding of XGen and dynamic curves for hair and fur simulation.	
Course Outcome: - Understand the fundamental principles of dynamics and simulate physical forces in a 3D environment. - Create and control particle systems including fluid effects, fire, and smoke using Maya's dynamics tools. - Apply nCloth simulation to create realistic cloth interactions, collisions, and constraints. - Set up rigid body dynamics, liquid simulations, and convert nParticles to geometry for visual effects. - Use XGen to add and style hair and fur on characters using dynamic curves and follicle attributes.	
Content	Hr
Unit - 1	
Introduction to Dynamics & Particle Systems- Introduction of dynamics in animation, software used for dynamics forces and fields, setting project and scene, particle system, particle types and attributes, Emitting and controlling particles, using fluid containers, using fields with fluids, Fluid interactions, making flames.	09
Unit – 2	
Forces, nCloth& Smoke Simulation - Gravity,vortex,turbulence,fieldexpressionsandmanipulation,nClothpropertiesandattributes ,creatingand simulating cloth objects, nCloth collisions and nConstraints, modeling cloths for nCloth, using constraints, paintingnCloth properties, igniting fuel, smoke	10

creation.	
Unit – 3	
Rigid Bodies & Liquid Simulation - Introduction to rigid body dynamics. Creating rigid bodies and constraints, simulating collisions and interactions, creating nParticles to simulate liquids, Creating liquid behaviour, Converting nParticles to polygons, Emitting nParticles using a texture, scope of dynamic artist in the animation industry..	10
Unit – 4	
XGen & Hair Dynamics - animating using dynamic curves, using dynamic curves with IK splines, creating an IK spline handle from the dynamic curve, using forces, Adding hair to a character, applying hair to a surface, Styling hair, painting follicle attributes.	10
Reference books: 1. Learning Maya – Dynamics, Paperback – Alias Wavefront, 1st July 2002. 2. FX Particles and Dynamics in Maya – 2013, Mike Zugschwert. 3. Introducing Maya 2009 – Dariush Derakhshani, Sybex, 1st Edition, 2009. 4. Eric Keller, Maya Visual Effects: The Innovator's Guide, Sybex, 2nd Edition, 2013.	

Course Code: DSP-14 Lab	Paper Title: Dynamics Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 3 Hours
Practical List The following activities are to be carried out in the lab during the semester: 1. Particle Simulation (Fire, Tornado, Rain) 2. Instance Particle 3. Rigid Body Simulation 4. Concept of Soft Body 5. Applications of Goal Tool 6. Dynamics Constraints 7. Collision Reactor 8. Use of Fields 9. Fluid Effects (Fire, Water flow, Pond collision) 10. Application of Paint Effects 11. Concept of Cloth Simulation 12. Concept of Fur Simulation 13. Concept of Hair Simulation 14. Creating Fireblast Simulation – Working on shading and colour 15. Creating Fireblast Simulation – Creating Debris 16. Creating Fireblast Simulation – Simulation and Rendering	
References: 1. Dariush Derakhshani, Introducing Maya 2009 – Sybex, 1st Edition, 2009. 2. Eric Keller, Maya Visual Effects: The Innovator's Guide – Sybex, 2nd Edition, 2013. 3. Learning Maya 7: The Special Effects Handbook, Alias Learning Tools, Sybex, 1st Editin, 2005. 4. Steve Wright, Compositing Visual Effects, 2nd Edition – Focal Press, 2011.	

Course Code: DSC-15	Course Name: Motion Graphics Design
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To develop understanding of design fundamentals including visual hierarchy, typography, and colour theory in motion context. - To familiarize students with animation principles including timing, spacing, and cinematic movement. - To expose students to broadcast standards, digital delivery formats, and motion graphics. - To provide awareness of visual effects theory, client communication, and portfolio development in the motion graphics industry.	
Course Outcome: - Apply design fundamentals including visual hierarchy, typography, colour theory, and Gestalt principles in motion design. - Implement classical animation principles including timing, spacing, and cinematic movement techniques. - Demonstrate knowledge of broadcast standards, digital delivery formats, and motion graphics production pipelines. - Develop a professional portfolio, showreel, and understand freelancing and industry workflow practices.	
Content	Hrs
Unit - 1	
Fundamentals of Motion Graphics & After Effects Interface- Definition and scope of motion graphics. History and evolution of motion graphics. Semiotics in motion design. Psychology of motion and viewer attention. Principles of storytelling through motion graphics. Understanding audience engagement. Visual perception and motion continuity.	09
Unit – 2	

Design Fundamentals & Animation Principles - Elements and principles of design. Gestalt principles in motion graphics. Visual hierarchy and composition theory. Colour psychology and emotional impact. Typography aesthetics and readability. Grid systems and layout structures. Classical animation principles. Persistence of vision. Frame-by-frame vs keyframe animation. Timing charts and spacing theory. Exaggeration and appeal in motion. Principles of cinematic movement.	10
Unit – 3	
Technical Standards & Motion Graphics Applications - Video formats and standards. Aspect ratios and screen resolutions. Compression and codecs. Colour spaces and bit depth. Broadcast standards and digital delivery. Workflow pipeline in motion graphics production. Broadcast graphics. Advertising and promotional media. Social media motion design. User Interface and User Experience animation. Educational and explainer videos. Corporate communication design.	10
Unit – 4	
Visual Effects Theory & Industry Readiness - Fundamentals of compositing. Chroma key theory. Matte generation concepts. Motion tracking concepts. Digital cinematography basics. Integration of live-action and graphics. Design ethics and copyright awareness. Client communication and presentation. Portfolio and showreel development. Industry pipeline and studio workflow. Freelancing and entrepreneurship basics.	10
Reference Books: 1. Adobe After Effects Classroom in a Book – Adobe Creative Team, Adobe Press. 2. Creating Motion Graphics with After Effects – Chris Meyer & Trish Meyer, Focal Press. 3. The Animator's Survival Kit – Richard Williams, Faber & Faber. 4. Motion Graphics: Principles and Practices from the Ground Up, Ian Crook & Peter Beare, Fairchild Books.	

Course Code: DSP-15 Lab	Paper Title: Motion graphics Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 3 Hours
Practical List The following activities shall be carried out in the lab. 1. Introduction to Adobe After Effects Interface and Workspace Customization 2. Basic Object Animation using Position, Scale, Rotation, and Opacity Keyframes 3. Bouncing Ball Animation using Principles of Timing and Spacing 4. Logo Reveal Animation using Shape Layers and Effects 5. Animated Lower Third and Title Design 6. Kinetic Typography Animation synchronized with Audio 7. Infographic Animation using Shape Layers and Trim Paths 8. Masking and Track Matte Based Transition Animation 9. Green Screen Keying and Basic Compositing Project 10. 3D Camera Movement and Parallax Motion Graphics Scene 11. Motion Tracking and Text Attachment to Moving Object	
Reference Books 1. Adobe After Effects Classroom in a Book – Adobe Creative Team, Adobe Press. 2. Creating Motion Graphics with After Effects – Chris Meyer & Trish Meyer, Focal Press. 3. The Animator's Survival Kit – Richard Williams, Faber & Faber. 4. Motion Graphics: Principles and Practices from the Ground Up – Ian Crook & Peter Beare.	

Course Code: DSC-16	Course Name: Ad Film Making
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To develop understanding of advertising research, market analysis, SWOT, USP, and campaign planning. - To equip students with production skills including storyboarding, direction, cinematography, and lighting. - To familiarise students with pre-production, production, and post-production stages of ad film making. - To introduce photography principles including camera types, exposure, composition, and lighting equipment.	
Course Outcome: - Describe the role of ad films in advertising, the structure of ad agencies, and the persuasion process in campaigns. - Conduct advertising research including SWOT analysis, USP identification, and campaign planning. - Apply cinematography, lighting, and direction principles to plan and produce a short ad film. - Manage pre-production, production, and post-production stages of an ad film effectively. - Demonstrate photography skills including camera handling, exposure settings, composition, and lighting.	
Content	Hrs
Unit - 1	

Video Advertising & Ad Agency Structure- Video advertising: Understanding the role of ad films in advertising and marketing, origin and growth, principles, impact, persuasion process, potential qualities of advertising, Modern advertising, Structure of advertising, function of different departments of ad agency, use of people in campaign planning..	09
Unit – 2	
Advertising Research & Production Planning - Advertising research activities, objectives of market analysis, product analysis, SWOT, USP, consumer profile, Motivational research. Campaign: Planning and execution process, Pre-production, production planning, production and post-production stages. Assembling the production team and casting, Location scouting and set design, Budgeting and scheduling for the production	10
Unit – 3	
Ad Production & Cinematography - Storyboarding techniques for visualizing the narrative, Direction, Principles of visual storytelling through cinematography, camera types, lens type, camera angles, Types of lighting – 3 key, Chroma, outdoor, indoor, differences between indoor and outdoor shoot, aspects of chroma shooting, usage of rig, slider, crane, jib jip.	10
Unit – 4	
Photography Principles & Techniques - Photography – types of cameras, usage of DSLR, aperture, shutter speed, ISO, exposure, lens and filters, rule of thirds, DOF, Focus, white balance, types of photography – product, architecture, candid, monochrome and silhouette, image quality and resolution, raw vs. jpeg, HDR, panorama, lighting equipment for photography – flash, strobe light, reflectors, softboxes, umbrellas.	10
Reference Books: 1. Chunnawala, Advertising Theory and Practices – Himalaya Publishing House, 2011. 2. Dennis P. Curtin, Digital Photography, 2004. 3. Roy Thompson and Christopher Bowen, Grammar of the Shot – Focal Press, 2009. 4. Seema Hasan, Mass Communication: Principles and Concepts – CBS, 2nd Edition, 2013.	

Course Code: DSC-17	Course Name: Digital Compositing
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To familiarize students with image generation concepts including pixels, channels, colour spaces, and bit depth. - To develop skills in image manipulation, layer blending, warping, expressions, and filtering algorithms. - To teach matte generation, keying techniques, tracking, and temporal manipulation in compositing workflows. - To provide knowledge of film formats, delivery standards (NTSC, PAL, HDTV), rotoscoping, and shoot conditions.	
Course Outcome: - Apply image manipulation techniques including warping, blending modes, filtering, and expression language. - Perform matte generation, keying, tracking, and temporal manipulation in compositing workflows. - Demonstrate knowledge of broadcast and film formats, shooting conditions, rotoscoping, and green/blue screen techniques. - Demonstrate photography skills including camera handling, exposure settings, composition, and lighting.	
Content	Hrs
Unit – 1	

Introduction to Digital Compositing & Image Fundamentals - Introduction digital compositing, role in post-production, Understanding the compositing pipeline, Introduction to industry-standard compositing software (e.g., Nuke, Adobe Premiere, Adobe After Effects, Blackmagic Fusion).Interface orientation and project setup, Importing and organizing assets. Image Generation: Pixels, Components and channels, Spatial Resolution, Bit depth, Normalized values, Additional Channels, HSV Colour Representation, Image Input Devices, Digital image File.	09
Unit – 2	
Image Manipulation & Layer Compositing - Compression, Choosing a File Format, Nonlinear Colour Spaces, Basic Image Manipulation Terminology, Colour Manipulations,3DTransforms,Warping,ExpressionLanguage,FilteringAlgorithms.Workin gwithlayersand blending modes, Layer organization and management, understanding blending modes and their applications, creating simple composites using multiple layers.	10
Unit – 3	
Matte Operations, Keying & Tracking - Matte Image: The integrated Matte Channel, Multisource operators: over, mix, subtract, In, Out, Atop. Masks, compositing with pre-multiplied images, colour difference method, specialized keying software. Matting techniques: garbage mattes, edge mattes, combining mattes, manipulating mattes. Time and temporal manipulations, apparentmotion, temporal resolution, temporal artifacts. Tracking: choosing the feature to track, limiting the search area, human intervention, using tracking curves manually, stabilizing a plate, tracking multiple points. .	10
Unit – 4	
Formats, Standards & Shooting Conditions - Interface interaction workflow, Media, resolution, aspect ratio, non-square pixels, format conversion pipeline. Film formats: 35mm formats, 16mm formats, specialized film formats, lines of resolution, colour resolution, gamma. NTSC, PAL, SECAM, HDTV, other formats. Reference stand-in, clean plates, film stocks, filters, rotoscoping, morphing. Shooting with blue screens, shooting with green screens. Scene continuity, lighting, shadows, lens flares, motion blur, focus, film grain.	10

Reference Books:

1. The Art and Science of Digital Compositing – Ron Brinkmann, Morgan Kaufmann, 2nd Edition.
2. Digital Compositing for Film and Video – Steve Wright, Focal Press.
3. The VES Handbook of Visual Effects – Jeffrey A. Okun & Susan Zwerman.
4. Steve Wright, Compositing Visual Effects, 2nd Edition – Focal Press, 2011.

Course Code: DSC-18	Course Name: Advanced CGI I
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To develop advanced 3D modeling skills for both organic and hard-surface models with efficient topology. - To teach advanced texturing, shading, and PBR (Physically Based Rendering) workflows. - To familiarize students with particle systems, fluid/smoke/fire simulations, cloth, hair, and fur dynamics. - To introduce VR/AR integration, CGI compositing with live action, and advanced render optimization techniques.	
Course Outcome: - Apply advanced 3D modeling techniques including subdivision surfaces, NURBS, and efficient topology management. - Set up advanced character rigs with blend shapes, IK/FK blending, and node-based shading networks. - Implement PBR rendering workflows with global illumination, HDRI, and realistic lighting scenarios. - Create complex simulations including fluid, fire, smoke, cloth, hair, and rigid body dynamics.	
Content	Hrs
Unit – 1	

Advanced 3D Modeling - High-poly vs. Low-poly modeling, Subdivision surfaces, Trends and Industry Applications, Review of Basic CGI Concepts, NURBS modeling, Sculpting techniques (e.g., ZBrush, Mudbox), Advanced 3D Modeling, Organic vs. Hard-surface modeling, Complex topology and efficient mesh management.	09
Unit – 2	
Advanced Rigging, Texturing & Shading - Advanced skeletal systems, Blend shapes and corrective morph targets, Sculpting techniques and tools, Muscle systems, Advanced Texturing and Shading, Procedural vs. Image-based Texturing, IK/FK blending, Procedural texture generation, Node-based shading networks, Material layering and blending.	10
Unit – 3	
Rendering, Lighting & Simulation - PBR (Physically Based Rendering) workflows, Global Illumination, High Dynamic Range Imaging (HDRI), Environment maps and reflections, Realistic lighting setups and scenarios, Particle systems and dynamics, Fluid, smoke, and fire simulations, Cloth, hair, and fur simulations, Rigid body dynamics and constraints, Character acting and emotion.	10
Unit – 4	
Motion Capture, VFX Integration & VR/AR - Motion capture integration, Advanced animation tools and workflows, Integration of CGI elements into live-action footage, Greenscreen techniques and matchmoving, Particle effects and simulations, Colour correction and grading, Ray tracing and ray casting, Image-based lighting, Advanced render settings and optimization, Creating interactive 3D experiences, VR/AR hardware and software integration, User experience and interface design for VR/AR.	10
Reference Books: 1. Digital Lighting and Rendering – Jeremy Birn, New Riders, 3rd Edition. 2. The Art and Science of Digital Compositing – Ron Brinkmann, Morgan Kaufmann. 3. ZBrush Digital Sculpting Human Anatomy – Scott Spencer, Sybex. 4. 3ds Max Projects: A Tutorial Approach – Kelly L. Murdock, Sybex.	

Course Code: Compulsory 4	Course Name: Virtual Reality Lab
Course Credits: 2	Hours of Teaching/Week: 2
Total Contact Hours: 26	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 2 Hours
List of Practical 1. Practical 1: Creating Basic 3D Objects for VR Environment 2. Practical 2: Low Poly VR Environment Modeling 3. Practical 3: UV Mapping and Texturing for VR Assets 4. Practical 4: Lighting Setup for Virtual Reality Scene 5. Practical 5: Camera Animation for VR Walkthrough 6. Practical 6: Creating and Animating VR Objects 7. Practical 7: Exporting VR Assets from Maya	
Reference: 1. Learning Virtual Reality: Developing Immersive Experiences and Applications – Tony Parisi, O'Reilly Media. 2. Digital Lighting and Rendering – Jeremy Birn, New Riders, 3rd Edition. 3. Mastering Autodesk Maya 2016 – Todd Palamar, Sybex. 4. ZBrush Character Creation: Advanced Digital Sculpting – Scott Spencer, Sybex, 2nd Edition.	

SEMESTER VI

BSc – Animation and Visual Effects	
Semester VI	
Course Code: DSC-19	Course Name: Advanced Character Animation
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To develop understanding of body mechanics including centre of gravity, weight, force, momentum, and energy transfer in movement. - To teach facial animation principles covering muscle structure, expression theory, phonemes, and lip-sync techniques. - To enable students to animate dialogue scenes by integrating audio analysis, phonetics, emotion, and speech synchronisation. - To familiarise students with the full production pipeline including pre-production, storyboarding, team collaboration, and demo reel preparation.	
Course Outcome: - Apply principles of body mechanics including weight, force, momentum, and balance to create believable character movement. - Animate facial expressions using muscle theory, phoneme shapes, and expression-based emotion techniques.	

- Produce a lip-synced dialogue animation with correctly analysed audio and synchronised emotion. - Develop a professional demo reel and understand the animation production pipeline and career pathways.	
Content	
Unit - 1	
Fundamentals of Character Animation and Maya Workflow- History and evolution of character animation. Traditional vs digital character animation. Role of character animation in film, television, gaming, and advertising. Animation pipeline overview. Responsibilities of a character animator.Character rigs and rig hierarchy. FK and IK systems. Controllers and constraints. Understanding deformation systems. Character setup and rig handling basics.	09
Unit – 2	
Fundamentals of Body Mechanics - Centre of gravity and balance. Weight distribution in movement. Force and momentum in animation. Realistic movement analysis. Energy and motion transfer. Character personality development. Emotional expression through body language. Gesture and posture analysis. Character motivation and intent. Performance timing and rhythm.	10
Unit – 3	
Facial Animation, Acting and Advanced Animation Techniques - Structure of facial muscles. Expression and emotion theory. Facial proportions and movement. Eye and eyebrow animation. Mouth shapes and phonemes. Principles of dialogue animation. Phonetics and mouth shapes. Audio analysis techniques. Synchronisation of speech and emotion. Dialogue timing and pacing.	10
Unit – 4	

Production Pipeline, Cinematic Animation and Portfolio Development - Pre-production planning. Storyboarding and animatics. Shot breakdown and scheduling. Team collaboration workflow. Asset management and scene organisation. Animation studio pipeline overview. Role of animator in production. Client requirements and communication. Portfolio and demo reel preparation. Freelancing and career opportunities.	10
Reference Books: 1. How to Cheat in Maya 2017: Tools and Techniques for Character Animation – Paul Naas, Focal Press. 2. The Game Animator's Guide to Maya – Michael McKinley, Sybex. 3. Acting for Animators – Ed Hooks, Heinemann Drama, Revised Edition. 4. The Animator's Survival Kit – Richard Williams, Faber & Faber. 5. Character Animation Crash Course! – Eric Goldberg, Silman-James Press.	

Course Code: DSP-16 Lab	Paper Title: 3D Character Animation Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 3 Hours
Practical List The following activities are to be carried out in the lab during the semester: 1. Weight Lifting Animation 2. Sneak and Stealth Walk Cycle 3. Animal Walk Cycle 4. Cartoon Exaggeration Animation 5. Dialogue Acting Scene 6. Dance Animation	

7. Emotional Transition Animation 8. Creature Animation 9. Action Chase Sequence 10. Physics-Based Animation 11. Hand Gesture and Lip-Sync Animation 12. Facial Expression Animation
Reference Books : 1. How to Cheat in Maya 2017: Tools and Techniques for Character Animation – Paul Naas, Focal Press. 2. The Animator's Survival Kit – Richard Williams, Faber & Faber. 3. Acting for Animators – Ed Hooks, Heinemann Drama, Revised Edition. 4. The Game Animator's Guide to Maya – Michael McKinley, Sybex.

Course Code: DSC-20	Course Name: Psychology of Animation
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To apply visual perception theories and Gestalt principles to understand audience attention and engagement in animation. - To analyse character design psychology including archetypes, empathy, body language, and emotional appeal. - To explore narrative psychology and the psychological techniques used in pacing, framing, symbolism, and metaphor. - To evaluate the social, cultural, and media-psychological influence of animated content across different audience demographics.	
Course Outcome:	

- Use Gestalt principles and visual perception theory to design animations that effectively guide audience attention. - Analyse character design through the lens of psychology including archetypes, empathy, and emotional appeal. - Apply narrative psychology techniques including pacing, framing, symbolism, and metaphor in animation projects. - Evaluate the social, cultural, and media-psychological impact of animated content on diverse audiences.	
Content	Hr
Unit - 1	
Psychology and Animation - Relationship between psychology and animated storytelling. How animation influences human emotions. Suspension of disbelief in animation. Psychological impact of animated characters. Visual perception theory. Gestalt principles in animation. Depth, shape, movement, and visual balance. Eye movement and audience attention.	09
Unit – 2	
Psychology of Character Design - Creating believable characters. Personality development in animation. Archetypes and stereotypes. Body language and posture psychology. Empathy and emotional attachment. Cute character psychology. Fear, humour, sadness, and excitement in animation. Psychological appeal of animated mascots and icons.	10
Unit – 3	
Psychology of Storytelling - Human attraction toward stories. Narrative psychology. Emotional structure of storytelling. Story pacing and audience engagement. Camera angles and emotional meaning. Framing psychology. Visual hierarchy in scenes. Psychological impact of perspective. Symbols and subconscious meaning. Metaphors in animation	10
Unit – 4	
Media Psychology - Psychological influence of animated media. Animation in advertising and branding. Social and cultural influence of cartoons. Children's psychology and animation. Age-based audience behaviour. Gender and cultural response to animation. Audience expectations and satisfaction. Viewer engagement techniques.	10

Reference books:

1. The Animator's Survival Kit – Richard Williams, Faber & Faber.
2. Acting for Animators – Ed Hooks, Heinemann Drama, Revised Edition.
3. The Psychology of Entertainment Media – L. J. Shrum (Ed.), Lawrence Erlbaum Associates.
4. Storytelling with Data – Cole Nussbaumer Knaflie, Wiley.
5. Influence: The Psychology of Persuasion – Robert B. Cialdini, Harper Business.

Course Code: DSP-17 Lab	Paper Title: Motion Graphics in 3D Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 3 Hours
Practical List	
The following activities are to be carried out in the lab during the semester:	
1. Introduction to Motion Graphics in Maya 2. Basic Object Motion Animation 3. 3D Typography Animation 4. Logo Reveal Animation	

5. Camera Motion Graphics
6. Lighting for Motion Graphics
7. MASH Motion Graphics System
8. Particle and Dynamic Motion Graphics
9. Product Showcase Animation
10. Broadcast Graphics Design
11. Audio-Based Motion Graphics
12. Final Motion Graphics Project

References:

1. Creating Motion Graphics with After Effects – Chris Meyer & Trish Meyer, Focal Press.
2. Motion Graphics: Principles and Practices from the Ground Up – Ian Crook & Peter Beare, Fairchild Books.
3. Adobe After Effects Classroom in a Book – Adobe Creative Team, Adobe Press.
4. The Animator's Survival Kit – Richard Williams, Faber & Faber.

Course Code: DSC-21	Course Name: Introduction to ZBrush
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To develop foundational knowledge of human anatomy including skeletal structure, muscle forms, and body proportions for sculpting. - To teach character design principles covering stylised vs realistic aesthetics, creature creation, and silhouette readability. - To enable students to apply surface detailing techniques including skin textures, wrinkles,	

cloth, and hard surface detailing. - To familiarise students with advanced concepts including retopology, UV mapping, portfolio building, and industry standards.	
Course Outcome: - Apply knowledge of human anatomy including skeletal structure, muscle forms, and body proportions to digital sculpts. - Design stylised and realistic characters with strong silhouettes and creature creation principles. - Apply surface detailing techniques including skin textures, wrinkles, pores, cloth, and hard surface details. - Understand retopology, UV mapping, and portfolio presentation standards required by the animation and games industry. Develop a professional portfolio, showreel, and understand freelancing and industry workflow practices.	
Content	Hrs
Unit - 1	
Fundamentals of Digital Sculpting and ZBrush Interface - Definition of digital sculpting. Traditional sculpting vs digital sculpting. Importance of sculpting in animation, VFX, and gaming. Forms and volumes. Primary, secondary, and tertiary details. Silhouette importance in sculpting. Understanding proportions and balance. ZBrush Interface and Tools: User interface overview. Navigation and viewport controls. Understanding brushes and tools. Subtools and palettes. Introduction to Dynamesh and ZRemesher.	09
Unit – 2	
Human Anatomy and Character Design for Sculpting- Introduction to skeletal structure. Muscle forms and anatomy basics. Male and female body proportions. Facial anatomy fundamentals. Character development process. Stylised vs realistic characters. Character silhouettes and readability. Costume and accessory design theory. Conceptual thinking in creature creation. Combining animal and human anatomy. Fantasy and sci-fi sculpting principles. Psychological impact of creature appearance.	10
Unit – 3	

Surface Detailing Techniques - Skin detailing concepts. Wrinkles, pores, and surface textures. Cloth and fabric sculpting theory. Hard surface detailing concepts. Importance of lighting in sculpt presentation. Mood creation through light and shadow. Visual focus and composition. Viewer attention and emotional direction.	10
Unit – 4	
Advanced Concepts and Industry Applications - High-resolution sculpting theory. Retopology concepts. UV mapping fundamentals. Optimisation for animation and games. Building a professional sculpt portfolio. Presentation techniques. Turntable and render presentation concepts. Industry expectations and standards.	10
Reference Books: 1. ZBrush Digital Sculpting Human Anatomy – Scott Spencer, Sybex. 2. ZBrush Character Creation: Advanced Digital Sculpting – Scott Spencer, Sybex, 2nd Edition. 3. Anatomy for Sculptors: Understanding the Human Figure – Uldis Zarins & Sandis Kondrats. 4. The Art of ZBrush – Paolo Ciccone, 3dtotal Publishing. 5. Digital Sculpting with Mudbox: Essential Tools and Techniques for Artists – Mike de la Flor & Bridgette Mongeon, Focal Press.	

Course Code: DSP-18 Lab	Paper Title: ZBrush Fundamentals Lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 3 Hours

Practical List

The following activities shall be carried out in the lab.

1. Introduction to ZBrush Interface
2. Basic Digital Sculpting Exercises
3. Dynamesh and Sculpting Workflow
4. Hard Surface Sculpting
5. Human Head Sculpting
6. Character Bust Sculpting
7. Creature Sculpting
8. Hands and Feet Anatomy Sculpt
9. Surface Detailing and Texturing
10. Polypaint and Material Application
11. Retopology and UV Basics
12. Final Character Sculpt Project

Reference Books

1. ZBrush Digital Sculpting Human Anatomy – Scott Spencer, Sybex.
2. ZBrush Character Creation: Advanced Digital Sculpting – Scott Spencer, Sybex, 2nd Edition.
3. Anatomy for Sculptors: Understanding the Human Figure – Uldis Zarins & Sandis Kondrats.
4. The Art of ZBrush – Paolo Ciccone, 3dtotal Publishing.

Course Code: DSC-22	Course Name: The Future of Animation and VFX
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours

Objective:

- To introduce students to advanced VFX concepts including digital doubles, AI-generated environments, and procedural effects.
- To analyse emerging animation styles including hyper-realism, hybrid techniques, and interactive storytelling.
- To evaluate the ethical, legal, and social challenges of AI, deepfakes, automation, and data privacy in animation and VFX.
- To explore future production pipelines including cloud-based collaboration, metaverse, digital humans, and scientific visualisation.

Course Outcome:

- Trace the evolution of animation and VFX technologies and understand their impact on modern production pipelines.
- Analyse emerging animation styles and interactive storytelling techniques across platforms.
- Critically evaluate the ethical, legal, and social challenges surrounding AI, deepfakes, and automation in media.
- Describe future production models including cloud collaboration, metaverse content creation, and digital humans.

Content	Hrs
Unit - 1	
Evolution and Emerging Trends in Animation & VFX - Evolution from traditional to digital animation. Development of VFX technologies. Milestones in animation and cinematic effects. Transformation of production pipelines. Global animation and VFX industry overview. Major studios and production houses. Growth of OTT and streaming platforms. Animation in advertising, education, and gaming.	09
Unit – 2	
Advanced VFX Concepts - CGI advancements. Digital doubles and realistic simulations. Fluid, smoke, fire, and destruction simulations. Procedural effects systems. AI-generated environments and characters. Deepfake technology and ethical concerns. Automated animation systems. AI-assisted editing and compositing. Digital filmmaking trends. Interactive cinema. Holographic entertainment concepts. Audience participation in storytelling.	10
Unit – 3	
Evolution of Animation Styles and Storytelling - Hyper-realistic animation. Stylised animation trends. Hybrid animation techniques. Experimental and	10

abstract animation. Interactive storytelling. Non-linear narratives. AI-generated stories. Cross-platform storytelling techniques. Ethical issues in digital manipulation. Data privacy in immersive media. Challenges in automation and employment.	
Unit – 4	
Future Production Pipelines and Industries - Collaborative cloud production. Remote animation studios. Automation in production workflows. Asset sharing and digital libraries. Scientific visualisation. Medical and educational animation. Simulation-based animation. Research applications of VFX. Future entertainment industries. Metaverse and digital worlds. Digital humans and virtual influencers. Predictions for next-generation media industries.	10
Reference Books: 1. The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures – Jeffrey A. Okun & Susan Zwerman, Focal Press. 2. Digital Humans: The Definitive Guide – Thomas B. Sheridan, MIT Press. 3. Artificial Intelligence: A Guide for Thinking Humans – Melanie Mitchell, Farrar, Straus and Giroux. 4. Digital Lighting and Rendering – Jeremy Birn, New Riders, 3rd Edition. 5. The Art and Science of Digital Compositing – Ron Brinkmann, Morgan Kaufmann, 2nd Edition.	

Course Code: DSC-23	Course Name: The Business of Animation and VFX
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20

Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To provide an overview of the global animation and VFX industry including major studios, OTT platforms, and freelancing opportunities. - To develop understanding of production budgeting, cost estimation, revenue models, and monetisation strategies in animation. - To apply digital marketing fundamentals and promotional strategies for animated content across media platforms. - To analyse audience psychology, global trends, and cultural influences on media consumption and content planning. - To equip students with knowledge of entrepreneurship, studio setup, business planning, and career development in animation and VFX. Course Outcome: - Apply production budgeting principles and evaluate revenue models and monetisation strategies for animation projects. - Design digital marketing campaigns and promotional strategies for animated content on multiple platforms. - Analyse audience psychology, global trends, and cultural factors that influence media consumption. - Develop a business plan for an animation or VFX studio and identify entrepreneurship and career opportunities.	
Content	Hrs
Unit - 1	
Overview of Animation and VFX Industry - Introduction to global animation and VFX industries. Growth and evolution of the industry. Major animation studios and production companies. Role of animation in entertainment, education, gaming, and advertising. Emerging markets in animation and VFX. OTT and streaming platform opportunities. Global outsourcing industry. Freelancing and independent production studios.	09
Unit – 2	

Budgeting, Revenue Models and Monetisation - Production budgeting concepts. Cost estimation techniques. Software, hardware, and infrastructure expenses. Managing production costs effectively. Revenue Models and Monetisation: Film and television revenue models. Licensing and merchandising. Digital content monetisation. Advertising and sponsorship models.	10
Unit – 3	
Marketing in Animation and VFX - Fundamentals of media marketing. Digital marketing strategies. Promotional campaigns for animated content. Marketing through social media platforms. Understanding target audiences. Audience psychology and preferences. Global audience trends. Cultural influence on media consumption.	10
Unit – 4	
Entrepreneurship in Animation and VFX - Starting an animation or VFX studio. Business planning fundamentals. Legal registration and company structure. Managing creative teams. Global career opportunities. International collaborations. Startup opportunities in creative industries. Future trends in entertainment business.	10
Reference Books: 1. Producing Animation – Catherine Winder & Zahra Dowlatabadi, Focal Press, 2nd Edition. 2. The Business of Media Distribution – Jeff Ulin, Focal Press. 3. Digital Marketing: Strategy, Implementation and Practice – Dave Chaffey & Fiona Ellis-Chadwick, Pearson. 4. The Lean Startup – Eric Ries, Crown Business. 5. Animation: From Script to Screen – Shamus Culhane, St. Martin's Griffin.	

Course Code: DSC-24	Course Name: Animation & VFX in
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	Gaming
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 39	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 3 Hours
Objective: - To develop understanding of real-time animation concepts, game engine workflows, and asset integration pipelines. - To teach character design principles for games including animation cycles, blending systems, and motion capture technology. - To enable students to understand real-time VFX production including particle effects, environmental simulations, and HUD animation. - To expose students to AI-driven characters, VR/AR animation principles, cinematic storytelling, and narrative design in games.	
Course Outcome: - Understand real-time animation workflows, game engine integration, and frame-rate performance optimisation. - Design and implement character animation cycles, blending systems, and motion capture-based game rigs. - Create real-time VFX including particle effects, environmental simulations, and animated game interface elements. - Evaluate AI-driven character systems, VR/AR animation concepts, and cinematic storytelling techniques in games.	
Content	Hrs
Unit - 1	
Introduction to Gaming and Real-Time Animation - History and evolution of video games. Growth of gaming industry. Types of games: Mobile games, PC games, Console games, VR games. Role of animation and VFX in gaming. Principles of animation in games. Difference between film animation and game animation. Real-time animation concepts. Frame rates and performance optimisation. Introduction to game engines. Real-time rendering concepts. Asset integration workflows. Animation systems in game engines	09
Unit – 2	
Character Animation and Rigging for Games - Character creation process. Stylised vs realistic game characters. Character silhouettes and readability. Character classes and archetypes. Idle, walk, run, jump, and combat cycles. Animation loops and transitions. Timing and responsiveness.	10

Animation blending systems. Basics of game rigging. Skeleton structures and joints. Inverse kinematics concepts. Motion capture technology.	
Unit – 3	
Real-Time VFX and Game Interface Animation - Importance of VFX in gameplay. Real-time VFX concepts. Performance optimisation in VFX. Visual feedback systems. Fire, smoke, water, and explosion effects. Magic and fantasy effects. Environmental effects systems. Physics-based simulations. Animated game interfaces. HUD and menu animations. Motion graphics in games. User experience design principles.	10
Unit – 4	
AI, VR/AR and Cinematic Storytelling in Games - AI-driven character behaviours. Procedural animation systems. NPC interaction systems. Adaptive gameplay experiences. VR animation principles. AR gaming concepts. Immersive interaction systems. Challenges in VR animation and VFX. Pre-rendered and real-time cinematics. Narrative design in games. Camera systems and cinematic direction. Emotional storytelling techniques.	10
Reference Books: 1. The Game Animator's Guide to Maya – Michael McKinley, Sybex. 2. Game Feel: A Game Designer's Guide to Virtual Sensation – Steve Swink, Morgan Kaufmann. 3. Real-Time Rendering – Tomas Akenine-Möller, Eric Haines & Naty Hoffman, A K Peters/CRC Press, 4th Edition. 4. The Art of Game Design: A Book of Lenses – Jesse Schell, CRC Press, 3rd Edition. 5. Unity in Action: Multiplatform Game Development in C# – Joe Hocking, Manning Publications.	

Course Code: Compulsory 4	Course Name: Animation Short Film Project (Mini Project)
Course Credits: 2	Hours of Teaching/Week: 2
Total Contact Hours: 26	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 2 Hours
Guidelines for the Mini Project: - Mini project is a mandatory paper for VI semester. A student shall compulsorily select a topic in consultation with the with the faculty or guide and report the same to the head of the department in writing. The topic of the mini project shall be relevant to any of the discipline specific core papers opted by the student. - Students can opt to do the min project individually or as a team consisting of not more than four members. - The Report should be about 25-20 pages. - At the end of the mini project students are expected to prepare a report on the same and submit a draft copy to the teacher in charge within 10th week of the VI semester. The final report in the prescribed format shall be submitted by the 12th week of the VI semester.	

Scheme of Assessment for Theory Examination

Question Pattern		Marks
Part – A		
1. Answer any TEN sub-questions (10×2=20)		20
Sub-question	Unit	
a, b, c	1	
d, e, f	2	
g, h,i	3	
j, k, l	4	
Part – B (Answer any ONE full question from each unit – 15 marks each) (Combinations of sub-questions of 3 to 6 marks)		
Unit-1		15
2.		
3.		
Unit-2		15
4.		
5.		
Unit-3		15
6.		
7.		
Unit-4		15
8.		
9.		
Total		80

The practical examination in the concerned subject specified in the I Semester to VII Semester shall be conducted for 50 marks. There shall be two components – Problem solving and execution and Viva voce components. 50 marks can be distributed as follows. Each Practical paper includes Two Parts- PART A and PART B. One question shall be asked in each part.

SN	Details			Marks	Total
1.	PART A	i.	Problem Solving Approach and Designing	8	18
		ii.	Virtual Tool Designing	5	
		iii.	Demonstration	5	
2.	PART B	i.	Problem Solving Approach and Designing	8	18
		ii.	Virtual Tool Designing	5	
		iii.	Demonstration	5	
3.	Record				4
Total Marks					40