

# ALAGAPPA UNIVERSITY

(Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle, Graded as Category-I University and granted autonomy by MHRD-UGC)

## DIRECTORATE OF COLLABORATIVE PROGRAMMES



## Master of Science in Game Technology

Regulations and Syllabus

[For those who join the Course in July 2023 and after]

CHOICE BASED CREDIT SYSTEM

## REGULATIONS AND SYLLABUS

*[For the candidates admitted from the academic year 2023 -2024 onwards]*

Name of the Subject Discipline : **GAME TECHNOLOGY**  
Programme of Level : **Postgraduate programme -  
M.Sc., Game Technology**

### 1. Choice-Based Credit System

A Choice-Based Credit System is a flexible system of learning. This system allows students to gain knowledge at their tempo. Students shall decide on electives from a wide range of elective courses offered by the Departments/institutions in consultation with the committee. Students undergo additional courses and acquire more than the required number of credits. They can also adopt an inter-disciplinary and intra-disciplinary approach to learning, and make the best use of the expertise of available faculty.

### 2. Programme:

“Programme” means a course of study leading to the award of a degree in a discipline. **M.Sc., Game Technology** is an Postgraduate programme and duration is **Two years**, the duration that is spread over **Four semesters**.

### 3. Courses

‘Course’ is a component (a paper) of a programme. Each course offered by the Department is identified by a unique course code. A course contains lectures / tutorials / laboratory work / seminars / project work / practical training /report writing / Viva- voce, etc, or a combination of these, to meet effective teaching and learning needs.

### 4. Credits

The term “Credit” refers to the weightage given to a course, usually about the instructional hours assigned to it. Normally in each of the courses credits will be assigned based on the number of lectures / tutorials / laboratory and other forms of learning required to complete the course contents in a 15-week schedule. One credit is equal to one hour of lecture per week. For laboratory / field work one credit is equal to two hours.

### 5. Semesters

An academic year is divided into two Semesters. In each semester, courses are offered in a minimum of 15 teaching weeks and the remaining 3-5 weeks are to be utilized for conduct of examination and evaluation purposes. Each week has 30 working hours spread over 5 days a week.

## 6. Departmental/institutional committee

The Departmental/Institutional Committee consists of the faculty of the Department/institution. The committee shall be responsible for admission to all the programmes offered by the Department including the conduct of entrance tests, verification of records, admission, and evaluation. The committee determines the deliberation of courses and specifies the allocation of credits semester-wise and course-wise. For each course, it will also identify the number of credits for lectures, tutorials, practicals, seminars, etc. The courses (Core / Discipline Specific Elective / Non-Major Elective) are designed by teachers and approved by the Committees. Courses approved by the committees shall be approved by the Board of Studies. A teacher offering a course will also be responsible for maintaining attendance and performance sheets (CIA -I, CIA-II, assignments, and seminar) of all the students registered for the course. The department coordinators for Non-major elective (NME) and MOOCs (SLC) courses are responsible to submit the performance sheet to the Head of the department. The Head of the Department consolidates all such performance sheets of courses about the programmes offered by the department. Then forward the same to be Controller of Examinations.

## 7. Programme Educational Objectives (PEO) :

The Program Educational Objectives (PEO's) describes the professional accomplishments and achievements of the graduates about three - five years after having completed the post-graduate program in Game Technology.

<b>PEO1</b>	Graduates can work as game developers, creating video games for various platforms such as PC, consoles, mobile devices, and VR/AR systems. Game developers may specialize in areas like programming, design, art, or audio.
<b>PEO2</b>	Graduates focus on honing their skills in their chosen field, whether it's programming, game design, art, or another specialization. They may work on small personal projects or contribute to indie game development teams to build their portfolios.
<b>PEO3</b>	Graduates can progress to mid-level positions, such as junior game developer, 3D artist, or level designer. Some may choose to specialize further, such as becoming a gameplay programmer or a character artist.
<b>PEO4</b>	Graduates may choose to start their own indie game studios or pursue entrepreneurial ventures.
<b>PEO5</b>	Some may pursue additional education, such as a master's degree, to further specialize or explore related fields like virtual reality (VR) or augmented reality (AR) development.

## 8. Programme Outcomes (PO)

Program Outcomes (PO's), are Graduates Attributes acquired by the graduate upon graduation. These relate to the skills, knowledge, and behavior that students acquire through the programme, based on initial capabilities, competence, skills, etc.

<b>PO1</b>	<b>Technical Proficiency:</b> Students will have a deep understanding of programming languages commonly used in game development.They will be proficient in using game engines like Unity or Unreal Engine to create interactive and visually appealing game environments.
<b>PO2</b>	<b>Artistic Abilities:</b> Students will develop artistic skills, including 2D and 3D graphics design, animation, and character modeling.They will be capable of creating visually stunning game assets that enhance the overall gaming experience.
<b>PO3</b>	<b>Game Testing and Quality Assurance:</b> Students will learn the techniques and methodologies for quality assurance and game testing to ensure the final product is free from major bugs and glitches.
<b>PO4</b>	<b>Modern Tool Usage:</b> In modern game development, key tools include Unity and Unreal Engine for game creation, along with Blender, Maya, Photoshop,Substance Painter enabling efficient collaboration and project management.
<b>PO5</b>	<b>Prototyping and Iteration:</b> Students will be skilled in rapid prototyping and iterative development, allowing them to refine game concepts and mechanics based on player feedback.
<b>PO6</b>	<b>Ethics:</b> Students will be aware of ethical and legal issues in the gaming industry, including intellectual property rights, privacy concerns, and responsible gaming practices.
<b>PO7</b>	<b>Individual and team Work:</b> Articulate and function effectively as an individual or in a multidisciplinary team, appreciate the leadership, principles, inventive personal vision and attitudes of the team and create conducive professional practices.
<b>PO8</b>	<b>Communication:</b> Communicate and represent through multimedia and digital technologies that meets out the multi diverse design community. Articulate and implement a potential communication tool to present to society at large.
<b>PO9</b>	<b>Project Management and Finance:</b> Students will gain project management skills to effectively plan, execute, and deliver game projects on time and within budgetThey will understand the importance of teamwork and collaboration in a game development studio.
<b>PO10</b>	<b>Lifelong Learning:</b> Students will develop a mindset of continuous learning, keeping up-to-date with evolving technologies and trends in the game industry.

## 9. Programme Specific Outcomes (PSO)

Programme Specific Outcomes (PSO's) are what the graduates should be able to do upon graduation. At the end of the M.Sc., Game Technology program, the Graduates

<b>PSO1</b>	Should be able to have technical proficiency to create interactive games using programming languages and game engines like Unity or Unreal Engine.They will be skilled in coding game features, implementing game mechanics, and optimizing game performance for various platforms, including PC, consoles, and mobile devices.
<b>PSO2</b>	Should be able to possess a deep understanding of game design principles, allowing them to craft captivating gameplay experiences.They will be proficient in designing levels, quests, puzzles, and storylines that challenge and entertain players.
<b>PSO3</b>	Should be able to have expertise in creating and integrating visual assets, including 2D and 3D graphics, animations, and special effects.They will understand the importance of maintaining a cohesive visual and auditory style throughout their projects.
<b>PSO4</b>	Should be able to excel in teamwork and communication within the game development industry, working alongside artists, programmers, writers, and other professionals.They will apply project management skills to plan, organize, and execute game development projects, ensuring they meet deadlines and stay within budget.
<b>PSO5</b>	Should be able to be well-versed in ethical and legal considerations within the gaming industry, ensuring their projects adhere to copyright laws, privacy regulations, and responsible gaming practices.They will stay current with industry trends, adopting emerging technologies, platforms, and business models to remain competitive in the dynamic field of game development.

## 10. Eligibility for admission

A pass in the 3 years Under Graduate Degree recognized by the UGC, or an examination accepted as equivalent thereto by the Syndicate for admission to this program.

## 11. Minimum Duration of Programme.

The programme is for two years. Each year shall consist of two semesters viz. Odd and Even semesters. Odd semesters shall be from June / July to October / November and even semesters shall be from November / December to April / May. Each semester there shall be 90 working days consisting of 6 teaching hours per working day (5 days/week).

## 12. Medium of instruction

The medium of instruction is English

### **13. Teaching Methods**

The classroom teaching would be through conventional lectures, the use of OHP, PowerPoint presentation, and novel innovative teaching ideas like television, smart board, and computer-aided instructions. Periodic field visit enables the student to gather practical experience and up-to-date industrial scenarios. Student seminars would be arranged to improve their communicative skills. In the laboratory, safety measures instruction would be given for the safe handling of chemicals and instruments. The lab experiments shall be conducted with special efforts to teach scientific knowledge to students. The students shall be trained to handle advanced instrumental facilities and shall be allowed to do experiments independently. The periodic test will be conducted for students to assess their knowledge. Slow learners would be identified and will be given special attention by remedial coaching. Major and electives would be held in the Department and for Non-major electives students have to undertake other subjects offered by other departments.

### **14. Components**

A UG programme consists of several courses. The term “course” is applied to indicate a logical part of the subject matter of the programme and is invariably equivalent to the subject matter of a “paper” in the conventional sense. The following are the various categories of the courses suggested for the PG programmes:

#### **Core courses (CC)**

“Core Papers” means “the core courses” related to the programme concerned including practicals and project work offered under the programme and shall cover core competency, critical thinking, analytical reasoning, and research skill.

#### **Generic Elective (Allied)**

Within the faculty, the students shall undergo two discipline-specific allied courses (one in the first year and another in the second year of his/her study except for computer application).

#### **Discipline-Specific Electives (DSE)**

DSE means the courses offered under the programme related to the major but are to be selected by the students, shall cover additional academic knowledge, critical thinking, and analytical reasoning.

#### **Non-Major Electives (NME) - Exposure beyond the discipline Self-Learning Courses from MOOCs platforms**

❖ MOOCs shall be voluntary for the students.

❖ Students have to undergo a total of 2 Self Learning Courses (MOOCs) one

in II semester and another in III semester.

- ❖ The actual credits earned through MOOCs shall be transferred to the credit plan of programmes as extra credits. Otherwise, 2 credits/course be given if the Self Learning Course (MOOC) is without credit.
- ❖ While selecting the MOOCs, preference shall be given to the course related to employability skills

### **Dissertation (Maximum Marks: 200)**

The candidate shall undergo Dissertation Work during the fourth semester. The candidate should prepare a scheme of work for the dissertation and should get approval from the guide. The candidate, after completing the dissertation, shall be allowed to submit it to the departments at the end of the final semester.

### **No. of copies of the dissertation/internship report**

The candidate should prepare three copies of the dissertation/report and submit the same for the evaluation of examiners. After evaluation, one copy will be retained in the department library, one copy will be retained by the guide and the student shall hold one copy.

## **15. Attendance**

Students must have earned 75% of attendance in each course for appearing on the examination. Students who have earned 74% to 70% of attendance need to apply for condonation in the prescribed form with the prescribed fee. Students who have earned 69% to 60% of attendance need to apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students who have below 60% of attendance are not eligible to appear for the End Semester Examination (ESE). They shall re-do the semester(s) after completion of the programme.

## **16. Examination**

The examinations shall be conducted separately for theory and practicals to assess (remembering, understanding, applying, analyzing, evaluating, and creating) the knowledge required during the study. There shall be two systems of examinations viz., internal and external examinations. The internal examinations shall be conducted as Continuous Internal Assessment tests I and II (CIA Test I & II)

***Internal Assessment:***

The internal assessment shall comprise a maximum of 25 marks for each course

**Theory - 25 marks**

<b>Sr. No.</b>	<b>Content</b>	<b>Marks</b>
1	Average marks of two CIA test	15
2	Seminar/group discussion/quiz, etc.,	5
3	Assignment/field trip report/case study reports	5
	<b>Total</b>	<b>25</b>

**Practical - 25 marks**

<b>Sr. No.</b>	<b>Content</b>	<b>Marks</b>
1	Average marks of two CIA tests (Practical) Experiments –Major, Minor, and Spotter	15
2	Observation notebook	10
	<b>Total</b>	<b>25</b>

**Internship - 25 Marks (assess by Guide/ In-charge/HOD/supervisor)**

<b>Sr. No.</b>	<b>Content</b>	<b>Marks</b>
1	Presentation	15
2	Progress report	10
	<b>Total</b>	<b>25</b>

**Dissertation – 50 Marks (Guide/HOD)**

<b>Sr. No.</b>	<b>Content</b>	<b>Marks</b>
1	Two presentations (mid-term)	30
2	Progress report	20
	<b>Total</b>	<b>50</b>

***External Examination***

- ❖ There shall be examinations at the end of each semester, for odd semesters in October / November; for even semesters in April / May.
- ❖ A candidate who does not pass the examination in any course(s) may be permitted to appear in such failed course(s) in the subsequent examinations to be held in October / November or April / May. However, candidates who have arrears in practical shall be permitted to take their arrear Practical examination only along with regular practical examination in the respective semester.

- ❖ A candidate should get registered for the first-semester examination. If registration is not possible owing to a shortage of attendance beyond the condonation limit / regulation prescribed OR belated joining OR on medical grounds, the candidates are permitted to move to the next semester. Such candidates shall re-do the missed semester after completion of the programme.
- ❖ For the Dissertation Work, the maximum marks will be 100 marks for thesis evaluation and the Viva-Voce 50 marks.
- ❖ For the internship, the maximum mark will be 50 marks for project report evaluation and for the Viva-Voce it is 25 marks
- ❖ Viva-Voce: Each candidate shall be required to appear for the Viva-Voce Examination (in defense of the Dissertation Work/internship)

### **17. Passing minimum**

- ❖ A candidate shall be declared to have passed each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 40% for UG and PG 50% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.
- ❖ The candidates not obtained 40% for UG and PG 50% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests and by submitting assignments.
- ❖ Candidates, who have secured the pass marks in the End - Semester Examination and the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.
- ❖ A candidate shall be declared to have passed the Project Work if he /she gets not less than 40% in each of the Project Report and Viva-Voce and not less than 40 % UG and in PG 50% in the aggregate of both the marks for Project Report and Viva-Voce.
- ❖ A candidate who gets less than 40% for UG and PG 50% in the Project Report must resubmit the Project Report. Such candidates need to take again the Viva-Voce on the resubmitted Project.

**SYLLABUS UNDER CBCS PATTERN w.e.f.2023-24)**

**M.Sc Game Technology**

**I Semester**

Sem.	Part	Courses	Course Code	Title of the Paper	T/P	Cr.	Hrs./Week	Max. Marks		
								Int.	Ext.	Total
I	III	CC1	83711	Advanced Game Development	T	5	5	25	75	100
		CC2	83712	Advanced Game Design and Analysis	T	5	5	25	75	100
		CC3	83713	Game Conceptualization	T	4	4	25	75	100
		CC4	83714	Game Programming	T	4	4	25	75	100
		CC5	83715	Game Programming - Practical	P	4	8	25	75	100
		DSE – 1	83716A 83716B 83716C	1. History of Art in Games 2. Game Math and Physics 3. Advanced Art for Game Character	T	3	3	25	75	100
	IV	SLC - 1	Library			1				
				<b>Total</b>		<b>25</b>	<b>30</b>	<b>150</b>	<b>450</b>	<b>600</b>

**II Semester**

II	III	CC6	83721	2D Art	T	4	4	25	75	100
		CC7	83722	Advanced 3D Design Techniques	T	4	4	25	75	100
		CC8	83723	Specialized Game Engine-I	T	4	4	25	75	100
		CC9	83724	Web Game Programming-Practical	P	4	4	25	75	100
		CC10	83725	Specialized Game Engine I - Practical	P	4	8	25	75	100
		DSE – 2	83726A 83726B 83726C	1. Game Engine Specialization 2. Game Level Designing 3. Shader Programming	T	3	3	25	75	100
	IV	NME - 1	83727A 83727B 83727C	1. Digital Cinematography - Practical 2. 2D Animation Techniques - Practical 3. Graphic Designing - Practical	P	2	3	25	75	100
		SLC - 1	83728	Self Learning courses (SLC) - MOOCs**						
				<b>Total</b>		<b>25</b>	<b>30</b>	<b>175</b>	<b>525</b>	<b>700</b>

**III Semester**

III	III	CC11	83731	Specialized Game Engine - II	T	4	4	25	75	100
		CC12	83732	Advanced Mobile Game Development	P	4	4	25	75	100
		CC13	83733	Emerging Technologies in Game Development	T	4	4	25	75	100

		CC14	83734	Mini project	PR	4	4	25	75	100
		CC15	83735	Specialized Game Engine - II - Practicals	P	4	8	25	75	100
		DSE – 3	83736A 83736B 83736C	1. Advanced Game Programming 2. Advanced Game Art 3. Artificial Intelligence for Games	T	3	3	25	75	100
	IV	NME – 2	83737A 83737B 83737C	1.Video & Audio Editing 2. Lighting and Rendering 3. Matte Painting	P	2	3	25	75	100
		SLC – 2	83738	Self Learning courses (SLC) - MOOCs**						
				<b>Total</b>		<b>25</b>	<b>30</b>	<b>175</b>	<b>525</b>	<b>700</b>
<b>IV Semester</b>										
IV		CC16	83741A 83741B	Dissertation/ Internship	D/ I	15	30	50	150	200
				<b>Total</b>		<b>15</b>	<b>30</b>	<b>50</b>	<b>150</b>	<b>200</b>
<b>Grand Total</b>						<b>90</b>	<b>120</b>	<b>550</b>	<b>1650</b>	<b>2200</b>

I-Semester					
Core	Course Code: 83711	Advanced Game Development	T	Credits: 5	Hours: 5
Objectives	<ol style="list-style-type: none"> <li>1. To develop knowledge over the game design principles</li> <li>2. To get knowledge about the function of games.</li> <li>3. To educate students about characters and Real vs Virtual Architecture of the games</li> <li>4. Discuss about game mechanics and methodologies of balancing the game.</li> <li>5. To educate students about the taxonomy of players and game flow.</li> </ol>				
Unit - I	Introduction to communication - Interactive and New Media - Human Computer Interaction Fundamentals - Ethics of New Media - Evolution of Games - Basic terminologies - Types Of Games - Game Genres - Three Practical Approaches - Core Dynamics - MDA - Mechanics, Dynamics - Aesthetics - MDA at work - Tuning - Flow - Types of Fun - Types of Players - Skill vs Difficulty - Affordability - Orthogonality - Tension maps in Game Design - Circumspection				
Unit - II	Social function of Games - Dramatic Elements of Game - Structuring a Game - Linear Plot - Braided Plot - Branching Tree - Networks - Open Worlds - The Loop of Interaction - Channels Of Information Gameplay - Chance - Probability - Alea - Strategy - Skill - Adding and Subtracting Mechanics - Emergence and Progression In Games - Integrating Emergence and Progression				
Unit - III	The Game World - Transmedia World - Properties - Common Elements of Successful Worlds - Nature of Game Characters - Spaces - Architecture - Organizing Game Space - Real vs. Virtual Architecture - Level Design - World Aesthetics - Value of Aesthetics - Audio of Environment - Letting Aesthetics Guide the Design - Balancing Art and Technology				
Unit IV	Games and Experience - Player's Experience - Modeling - Focusing - Empathising - Imagination - Motivating - Judgement - Game Mechanics - Space - Objects, Attributes and States - Actions - Rules - Skill - Chance - Interest Curves - Patterns inside Patterns - Factors of Interest - Game Balancing Methodologies - Balancing Game Economics - Dynamic Game Balancing				
Unit-V	Know your Players - Taxonomy of Players - Changing the Player Type Balance - Player Interactions - Flow of Influence - Dynamics of Player Taxonomy - Demographics - Psychographics - Ethics in Game Design - Ergodic, Code and Other Laws of Computer Game Design - Ethical Instances - Player Communities - Strong Communities				
Outcome 1	Understand and construct basic terminologies of game design.				K2&K3
Outcome 2	Examine and discuss the various game play designs.				K4&K6
Outcome 3	Analyze about the dynamics and aesthetics of the game design environment.				K4
Outcome 4	Evaluate the gaming experience and patterns used to create the games.				K5
Outcome 5	Creating a proper Game Design Document for the particular concept that has been chosen.				K6
<b>Reference and Text Books:</b>					
<p>M. Mahajan 2018 Production Planning And Control. New Delhi, Dhanpat Rai &amp; Co</p> <p>Rob Thompson 2014. Manufacturing Processes for Textile and Fashion Design Professionals. London, Thames &amp; Hudson</p> <p>Cooklin, G., Hayes, S. &amp; McLoughlin. (2006). Introduction to Clothing Manufacture. UK, Oxford: Blackwell Publishing.</p> <p>David J. Tyler. (2008). Harold Carr &amp; Barbara Latham's - The Technology of Clothing Manufacture. UK Oxford: Blackwell Publishing</p> <p>Martand Telsang, (2008). Industrial Engineering and Production Management. New Delhi: S. Chand &amp; Company Limited.</p> <p>Chuter, A.J. (2004). Introduction to Clothing Production Management. UK, Oxford: Blackwell Science.</p>					
<b>Online Resources</b>					
<p><a href="https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html">https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html</a></p> <p><a href="https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8">https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8</a></p> <p><a href="https://www.youtube.com/watch?v=BRk5WDWCyYM">https://www.youtube.com/watch?v=BRk5WDWCyYM</a></p> <p><a href="https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html">https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html</a></p>					

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>	<b>2</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

S–Strong (3), M-Medium (2), L-Low (1)

I-Semester					
Core	Course Code: <b>83712</b>	<b>Advanced Game Design and Analysis</b>	T	Credits: 5	Hours: 5
<b>Objectives</b>	<ol style="list-style-type: none"> <li>To present in-depth knowledge on game design and facilitate creation of solid game concepts.</li> <li>To get knowledge about mechanics and strategy of the game.</li> <li>To educate students about types of intellectual property and setting character for the game</li> <li>To explain to students about multiplayer game design and social network games.</li> <li>To educate students about how to create a user interface and gaming tool</li> </ol>				
<b>Outcome 1</b>	<b>Memorize the key terminologies and concepts involved in game design.</b>			<b>K1</b>	
<b>Unit - I</b>	Game design and Types of Design - Core of Game design - Common Terms - Approaches - Iterative Design - Constraints - Game Design Atoms - The Game State and Views -Players, Avatars and Game Bits - Mechanics, Dynamics, Goals and Theme - Puzzle Design - Types of Puzzles - Level Design and Puzzle Design				
<b>Unit - II</b>	Elements of Chance - The Role - Mechanics - Elements of Strategic Skill - The Role - Types of Decisions - Frequency of Decisions - Strategy and Tactics - Mechanics of Skill - Evaluation- Elements of Twitch Skill - Challenge - Tuning - Twitch Mechanics - Balancing Chance andSkill				
<b>Unit - III</b>	Intellectual Property - Types of IP - Sequels - Types of Sequels - Targeting a Market - Learning about the Target Market - Focus Groups - The Mass Market - Learning Unfamiliar Genre - Games to Tell stories - Story Arcs - Types of Stories in Games - Storytelling methods - Setting andCharacter - Working Backward				
<b>Unit -IV</b>	Adding Mechanics - Removing Mechanics - Making it a Multiplayer - Multiplayer - Multiplatform- Multipurpose - Types of Multiplayer Games - Issues in Multiplayer Game Design - Social Networks and Games - Propagation Mechanics in Social Network Games - Slowing the Speed- Leaderboards - Future of Social Networks and Games				
<b>Unit-V</b>	Creating a User Interface - Goals of UI - Feedback - Process of UI Design - Bad UI - Games as Art - Beyond the Visual - Beyond Fun - Games as a Teaching Tool - Designing and Modifying Games For Students - Serious Games - Types of Serious Games - The Focus Test - Casual Games - Reduced Complexity - Casual Conflicts				
CO 1	Memorize the key terminologies and concepts involved in game design.			K1	
CO 2	Evaluate and construct the role and mechanics of the game..			K3&K6	
CO 3	Learning about the target market and genre of the game.			K4	
CO 4	Capable of deconstructing games , identifying and understanding the various elements of games.			K5	
CO 5	Creating and improvising game concepts with various dimensions.			K2&K6	
<b>Reference and Text Books:</b>					
<p><u>M. Mahajan</u> 2018 Production Planning And Control.New Delhi, DhanpatRai&amp; Co</p> <p>Rob Thompson 2014. Manufacturing Processes for Textile and Fashion Design Professionals. London, Thames &amp; Hudson</p> <p>Cooklin, G., Hayes, S. &amp; McLoughlin. (2006). Introduction to Clothing Manufacture. UK, Oxford: Blackwell Publishing.</p> <p>David J. Tyler. (2008). Harold Carr &amp; Barbara Latham's - The Technology of Clothing Manufacture.UK Oxford: Blackwell Publishing</p> <p>MartandTelsang, (2008). Industrial Engineering and Production Management. New Delhi: S. Chand &amp; Company Limited.</p> <p>Chuter, A.J. (2004). Introduction to Clothing Production Management. UK, Oxford: BlackwellScience.</p>					

- **Online Resources**
- <https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html>
- <https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8>
- <https://www.youtube.com/watch?v=BRk5WDWCyYM>
- <https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>	<b>2</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

S–Strong (3), M-Medium (2), L-Low (1)

I-Semester				
Course Code 83713	Game Conceptualization	T	Credits:4	Hours: 4
<b>Objective1</b>	<ol style="list-style-type: none"> <li>1. To introduce the concept of perspective views in art and design.</li> <li>2. To help learners understand the essential aspects of figure drawing, including proportion, gesture, and the simplification of body parts into 2D shapes.</li> <li>3. To introduce learners to the core concepts and significance of design across creative disciplines.</li> <li>4. To introduce learners to the concept of textures in visual design and art, emphasizing their role in creating depth and visual interest.</li> <li>5. To provide an introduction to the field of concept art, emphasizing its role in visual development and creative processes.</li> </ol>			
<b>Unit -I</b>	<b>Perspective views :</b> Perspective views – types of perspective views – linear perspectives vs. aerial perspective – perspective terminology – horizon line/eye level , station point , picture plane , vanishing point – linear perspective construction			
<b>Unit - II</b>	<b>Figure drawing basics :</b> Figure drawing basics – Essentials of human figure drawing – Proportion and Gesture - Simplifying body parts in to 2D shapes – Relative proportion of various parts of the body - Constructing the front view using basic shapes - stick figure – line			
<b>Unit - III</b>	<b>Design fundamental:</b> Design fundamental - Characteristics of a good design - visual composition – Elements of design – Principles of Design - Gestalt principles - Visual Abstraction - Reducing Realism - Cognitive learning Model - Color theory - Attributes of Color - Color Wheel - Color Harmony - Color Schemes - Color Blending - Additive Model - Subtractive model - Color Contrast - Color Psychology -Typography - Classification - Type Families - Graphics - Types of Graphics			
<b>Unit IV</b>	<b>Introduction to textures:</b> Introduction to textures – Types of texture – Understanding the foreground, mid ground and background colour in textures – Useful tips on creating a texture - Creating texture using live reference.- Understanding scale and proportion - Study of different environment – Understanding different materials and their applications – Application of texture and colouring.in relation to the relevant subject.			
<b>Unit-V</b>	<b>Concept Art:</b> Concept Art - Introduction - Revisiting the basics - Styles - Cartoony, Realism and Hybrid - Environments - World Building - Architecture - Silhouettes - Character Sketching – Environment-Sketching - Props and Weapon Design - Vehicle Design - Storytelling - Introduction - Elements of Story - Scenes - Types of Scenes - Scene Constructions - Script writing - Script formatting - Storyboards - Introduction - Shots - Transitions - Views			
<b>Reference and Text Books:</b> Feifer RG, Tazbaz D, “Interface design principles for interactive multimedia”, Telematics and Informatics, 1997. Fred T. Hofstetter, “Multimedia literacy”, Tata McGraw-hill, 2001. Mark Elsom Cook, “Principles of Interactive Multimedia”, Tata McGraw-hill, 2001. Moreno R, Mayer R. “Interactive multimodal learning environments”, Educational psychology review, 2007. Tay Vaughan, “Multimedia making it work”, Tata McGraw-hill, Seventh Edition				

Outcomes		
CO1	Gain proficiency in perspective-related terminology, including horizon line/eye level, station point, picture plane, and vanishing point, enabling effective communication and implementation of perspective techniques.	K1
CO2	Develop a strong foundation in human figure drawing, allowing participants to confidently represent the human form in various artistic and design contexts.	K3&K6
CO3	Develop a strong foundation in design principles, enabling participants to create visually compelling and aesthetically pleasing compositions in various creative contexts.	K4
CO4	Develop a strong foundation in understanding and working with textures in visual design and art, enhancing participants' ability to create visually engaging compositions	K5
CO5	Develop a strong foundation in concept art, understanding its significance in visual development and creative processes	K2&K6

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	S(3)	S(3)	L(1)	L(1)	M(2)	L(1)	S(3)
CO2	L(1)	S(3)	M(2)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	M(2)	L(1)	L(1)	M(2)	M(2)	M(2)
CO4	L(1)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	S(3)	L(1)	M(2)
CO5	L(1)	S(3)	L(1)	S(3)	M(2)	L(1)	L(1)	M(2)	L(1)	S(3)
<b>W.AV</b>	<b>1</b>	<b>3</b>	<b>1.6</b>	<b>2.8</b>	<b>2.6</b>	<b>1</b>	<b>1</b>	<b>2.2</b>	<b>1.4</b>	<b>2.6</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	S(3)	S(3)	L(1)	L(1)
CO2	L(1)	S(3)	M(2)	M(2)	L(1)
CO3	M(2)	S(3)	M(2)	L(1)	L(1)
CO4	L(1)	S(3)	M(2)	M(2)	L(1)
CO5	L(1)	S(3)	M(2)	M(2)	L(1)
<b>W.AV</b>	<b>1.2</b>	<b>3</b>	<b>2.2</b>	<b>1.6</b>	<b>1</b>

S–Strong (3), M-Medium (2), L-Low (1)

I-Semester				
<b>Course Code:</b> 83714	<b>Game Programming</b>	<b>T</b>	<b>Credits: 4</b>	<b>Hours: 4</b>
<b>Objectives</b>	1. To develop in-depth knowledge in the fundamentals of computers. 2. Students identify and apply the basics of C++ programming concepts and techniques 3. To educate students about the concepts of arrays and structures. 4. Understanding the theory and practice of object oriented programming and learn how to implement constructor and overloading. 5. Educate students to learn how to use data structures in C++.			
<b>Unit -I</b>	Fundamentals of Computers - Introduction – History of Computers - Generations of Computers- Classification of Computers - Basic Anatomy of a Computer System-Input Devices - Processor- Output Devices - Memory Management – Types of Software - Overview of Operating System- Programming Languages-Translator Programs - Problem Solving Techniques			
<b>Unit-II</b>	Programming Basics - Programming Hello world - Data types - Variables - Constants - Operators- Conditional Statements – Looping - Functions - Understanding Functions - Pass values to functions – Inline function - Recursive functions			
<b>Unit -III</b>	Key Concepts – Arrays – One Dimensional – Two Dimensional – Multidimensional – Dynamic Arrays – Pointers – Pointers Advantage & disadvantage – Variable pointers – Generating pointer to an array – Function Pointers – Array pointers – Pointers to Pointers – Functions – Passing pointers to functions – Returning pointers – Passing Arrays to functions – User Defined Datatypes – Union & Enum – Structures			
<b>Unit -IV</b>	Classes - Objects - Encapsulation - Constructors - Destructors – Polymorphism– Types Of polymorphism – Abstraction - Virtual Function - Function Overloading - Overriding- Inheritance - Exception Handling - Templates			
<b>Unit V</b>	Standard Template Library - Containers – Sequences – Vector – List – deque - ContainerAdaptors – Stack – Queue - Algorithms - Mutating Algorithms – Swap – Replace - Remove- Sorting - Binary Search – Merge - Function Object - Random Number Generator - Iterators- Forward - Random Access - Data Structures Types - Linear Data Structure - Array - Linked List-Stack- Queue- Sorting - Searching - Trees - Graphs - Shortest Path Algorithm.			
<b>Reference and Text Books:</b>				
Bjarene Stroustrup, 2008 , “Programming: Principles and practices using C++”, Addison-Wesley Professional.				
E. Balagurusamy, 2008, “Computing Fundamentals & C Programming, Tata McGraw-Hill, 2nd Edition.				
Herbert Scheldt, 2002, “The Complete Reference C++”, Tata McGraw Hill.				
Scott Meyers, 2001. “Effective STL”, Strange cat Publication				
<b>Online Resources</b>				
<a href="https://www.programiz.com/cpp-programming">https://www.programiz.com/cpp-programming</a>				
<a href="https://www.javatpoint.com/cpp-tutorial">https://www.javatpoint.com/cpp-tutorial</a>				
<a href="https://www.mygreatlearning.com/blog/books-on-cpp/">https://www.mygreatlearning.com/blog/books-on-cpp/</a>				
<a href="https://www.youtube.com/watch?v=ZzaPdXTrSb8">https://www.youtube.com/watch?v=ZzaPdXTrSb8</a>				
<b>Outcomes</b>				
CO1	<b>Understand the concept of input and output devices of computers.</b>			<b>K1</b>
CO2	<b>Understand and develop the fundamentals of programming in c++.</b>			<b>K2&amp;K3</b>
CO3	<b>Classify the key concepts and work on functions, Array and Pointers.</b>			<b>K4</b>
CO4	<b>Evaluate OOPs concept and how to control error with exception handling.</b>			<b>K5</b>
CO5	<b>Understanding of algorithms in the problem-solving process.</b>			<b>K2</b>

**Reference and Text Books:**

- Bjarene Stroustrup, 2008 , “Programming: Principles and practices using C++”, Addison-WesleyProfessional.
- E. Balagurusamy,2008, “Computing Fundamentals & C Programming, Tata McGraw-Hill, 2ndEdition.
- Herbert Scheldt,2002, “The Complete Reference C++”, Tata McGraw Hill.
- Scott Meyers, 2001. “Effective STL”, Strangeat Publication.

**Online Resources**

<https://www.programiz.com/cpp-programming>

<https://www.javatpoint.com/cpp-tutorial>

<https://www.mygreatlearning.com/blog/books-on-cpp/>

<https://www.youtube.com/watch?v=ZzaPdXTrSb8>

**Course Outcome VS Programme Outcomes**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)
CO2	S(3)	S(3)	L(1)	L(1)	M(2)	L(1)	L(1)	M(2)	L(1)	M(2)
CO3	M(2)	M(2)	M(2)	M(3)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	L(1)
CO5	S(3)	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2.6</b>	<b>2.4</b>	<b>1.4</b>	<b>2.2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2.2</b>	<b>2</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

**Mapping Course Outcome VS Programme Specific Outcomes**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	L(1)	S(3)	L(1)	L(1)
CO2	M(2)	L(1)	S(3)	L(1)	L(1)
CO3	M(2)	L(1)	M(2)	M(2)	L(1)
CO4	M(2)	L(1)	S(3)	L(1)	M(2)
CO5	M(2)	L(1)	S(3)	L(1)	M(2)
<b>W.AV</b>	<b>2</b>	<b>1</b>	<b>2.8</b>	<b>1.2</b>	<b>1.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

I-Semester				
Course Code: 83715	Game Programming - Practical	P	Credits:4	Hours:8
<b>Objectives</b>	<ul style="list-style-type: none"> <li>➤ Design programs with user input, calculations, and interactive responses.</li> <li>➤ Employ conditional statements and branching logic for interactive game creation.</li> <li>➤ Utilize loop structures proficiently to manage repetition and control program flow.</li> <li>➤ Develop programs to read, process, and write data for specific outcomes.</li> <li>➤ Design and implement class hierarchies and inheritance for modeling complex systems.</li> </ul>			
	<ol style="list-style-type: none"> <li>1. Program to calculate the area and perimeter of different shapes based on user input.</li> <li>2. Write a program to rock-paper-scissors game: Implement a game where the player chooses rock, paper, or scissors and plays against the computer.</li> <li>3. Create a program to guess the number game: a program where the computer generates a random number and the player has to guess it, with hints if the guess is too high or too low.</li> <li>4. Create a program to countdown timer: create a countdown timer game where the player has to stop the timer at a specific value using loops.</li> <li>5. RPG character stats: define functions to calculate and display stats for a role-playing game character.</li> <li>6. Hangman game: Implement a simple hangman game where the player guesses letters to complete a word from an array of words.</li> <li>7. Write a program for player class: design a class that represents a player in a game, encapsulating attributes like name, score, and health.</li> <li>8. Create a program for Zoo simulation: model a zoo using classes with inheritance, like base Animal class and derived classes for specific animal types.</li> <li>9. Write a program that reads data from a file, processes it, and writes the results back to another file.</li> <li>10. Student Database: Design a program to manage a student database with features like adding, deleting, and displaying student records.</li> </ol>			
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>➤ Craft user-friendly interfaces, incorporate input effectively, perform accurate calculations, and present results coherently.</li> <li>➤ Cultivate dynamic decision-making skills, implement effective conditional logic, and construct engaging gameplay experiences.</li> <li>➤ Attain deep comprehension of loop mechanisms, create optimized algorithms for repetitive tasks, and confidently manage loop behavior.</li> <li>➤ Excel in data handling from files, implement processing algorithms, and derive insightful conclusions through data manipulation.</li> <li>➤ Internalize object-oriented principles, construct modular class structures, and adeptly employ abstraction for real-world modeling.</li> </ul>		K6	

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1.4</b>	<b>2</b>	<b>2.4</b>	<b>2</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	M(2)	M(2)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	M(2)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2.6</b>	<b>2.2</b>	<b>2</b>

S–Strong (3), M-Medium (2), L-Low (1)

I-Semester				
<b>Course Code:</b> 83716A	<b>Elective-I</b> <b>1. History of Art in Games</b>	<b>T</b>	<b>Credits: 3</b>	<b>Hours: 3</b>
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. It enables us to appreciate the richness and diversity of human history and culture.</li> <li>2. It allows us to appreciate the artistic achievements of this period and their enduring impact on the art and culture of subsequent eras.</li> <li>3. It provides valuable insights into the artistic achievements of these regions and their contributions to the global art and cultural landscape</li> <li>4. It offers profound insights into the rich tapestry of Indian culture, spirituality, and history.</li> <li>5. It enables individuals to appreciate the diversity of artistic expression and the enduring impact of these movements on the world of art.</li> </ol>			
<b>Unit -I</b>	Early civilization: - Paleolithic Age , Mesolithic Age , Neolithic Age (Cave of Altamira, Spain-Lascaux, Southwestern France, The Chauvet-Pont-d'Arc Cave , Southern France, Valley civilization (Harappa, Mohenjo Daro), Mesopotamia, Europe , Ancient Egypt).			
<b>Unit - II</b>	Medieval Art: - Focus on religious (Christian) themes, Hieratic Scale or Mental Perspective, Gothic, Renaissance, Baroque, Classicism, Greek and Roman, Rococo, Neoclassicism, Preservation and Conservation, Manuscript Illumination			
<b>Unit III</b>	Eastern Art: - (Art of China and Japan) Hand Scroll or Hanging Scroll, Pottery, Bronze Art, Calligraphy, Japanese Woodblock printing, Byobu, Mandala, Ukiyo-e			
<b>Unit IV</b>	Indian Art: - Mughal and Rajasthani miniature , Madhubani , Kangra and Warli painting , Ajantha & Ellora Cave paintings , Manuscript Painting (Pala, Jain) Company Painting.			
<b>Unit V</b>	Art Movements: - Romanticism, Impressionism, Post Impressionism, Expressionism, Cubism, Abstract - Dadaism, Surrealism, Pop Art, Optical art, contemporary Art and Design.			
<b>Reference and Text Books:</b>				
Tomory, Edith, "A History of Fine Arts in India and the West", Orient BlackSwan, 1989				
Goswamy, B. N. (2014). The Spirit of Indian Painting: Close encounters with 100 great works 1100-1900. Penguin UK.				
Gooding, M. (2001). Abstract Art (Movements in Modern Art Series). Tate publishing.				
<b>Online Resources</b>				
<a href="https://youtu.be/JWtOFF0iSbo?si=2VQctrZTswih-T5t">https://youtu.be/JWtOFF0iSbo?si=2VQctrZTswih-T5t</a>				
<a href="https://youtu.be/5xpJeO_syN4?si=zef-jJe86TpB_qJd">https://youtu.be/5xpJeO_syN4?si=zef-jJe86TpB_qJd</a>				
<a href="https://youtu.be/wSEtfqGWIN8?si=feMGZ_VMKIlakd8V">https://youtu.be/wSEtfqGWIN8?si=feMGZ_VMKIlakd8V</a>				
<b>Outcome</b>				
<b>CO1</b>	<b>Understanding early civilizations provides insights into the origins of human culture, societal development, and historical context.</b>			<b>K1</b>
<b>CO2</b>	<b>It encompasses a wide range of artistic styles, including Byzantine, Romanesque, and Gothic, and is characterized by its connection to religion, the church, and the societal context of the time.</b>			<b>K3&amp; K6</b>
<b>CO3</b>	<b>Studying Eastern art offers a rich and diverse exploration of cultural expression, spirituality, and historical development.</b>			<b>K4</b>
<b>CO4</b>	<b>It allows for a deep appreciation of the artistic achievements of this diverse and vibrant civilization and its enduring impact on the global art and cultural landscape.</b>			<b>K5</b>
<b>CO5</b>	<b>Provides a comprehensive view of the evolution of art and the dynamic interplay between artists, culture, and history.</b>			<b>K2&amp;K6</b>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
CO2	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	M(2)	S(3)
CO4	L(1)	M(2)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	S(3)
CO5	L(1)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
<b>W.AV</b>	<b>1</b>	<b>2.5</b>	<b>1.4</b>	<b>2.5</b>	<b>1.8</b>	<b>1.6</b>	<b>1.8</b>	<b>2.4</b>	<b>1.6</b>	<b>3</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	S(3)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	S(3)	S(3)	M(2)
CO5	L(1)	L(1)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>1</b>	<b>1.4</b>	<b>2.8</b>	<b>2.4</b>	<b>2.4</b>

S–Strong (3), M-Medium (2), L-Low (1)

I-Semester				
Course Code: 83716B	Elective-I 2. Game Math and Physics	T	Credits: 3	Hours:3
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. Understand Linear Algebra and Affine Algebra, covering number systems, matrices, vectors, coordinate systems, and transformations.</li> <li>2. Acquire expertise in vector operations, including advanced properties and quaternions, as well as mastering rotation matrices for 3D transformations.</li> <li>3. Analyze and interpret the dynamics of rigid bodies, showcasing comprehension of fundamental physics concepts.</li> <li>4. Illustrate a grasp of deformable body principles and their implications for understanding complex systems.</li> <li>5. Utilize vector calculus and fluid mechanics concepts to analyze and model fluid flow phenomena.</li> </ol>			
<b>UNIT-I</b>	<b>Linear Algebra:</b> A Review of Number Systems - Systems of Linear Equations - Matrices - Vector Spaces - Advanced Topics. <b>Affine Algebra:</b> Introduction - Coordinate Systems - Cartesian Coordinates - Subspaces - Transformations - Barycentric Coordinates.			
<b>UNIT II</b>	<b>Vectors:</b> Basic operations and properties – Advanced operations and properties - Approximation- Quaternions - Rotation Matrices - The Classical Approach - A Linear Algebraic - Approach- Interpolation of Quaternions - Derivatives of Time-Varying Quaternions			
<b>UNIT-III</b>	<b>Basic Concepts from Physics:</b> Rigid Body Classification - Rigid Body Kinematics - Newton’s Laws- Forces - Momenta - Energy - Rigid Body Motion - Newtonian Dynamics - Lagrangian Dynamics- Euler’s Equations of Motion			
<b>UNIT IV</b>	<b>Deformable Bodies:</b> Introduction - Elasticity, Stress, and Strain - Mass–Spring Systems - Control Point Deformation - Free-Form Deformation - Implicit Surface Deformation			
<b>UNIT V</b>	<b>Fluids and Gases:</b> Vector Calculus - Strain and Stress - Conservation Laws - A Simplified Model for Fluid Flow - Implementing the Simplified 2D Model -Implementing the Simplified 3D Model - Variations of the Simplified Model			
<b>Reference and Text Books:</b> Hartle JB, “Gravity: An introduction to Einstein’s general relativity”, 2003. O’Donnell LJ, Westin CF, “An introduction to diffusion tensor image analysis”, NeurosurgeryClinics. 2011. Schouten JA. “Ricci-calculus: an introduction to tensor analysis and its geometrical applications”, Springer Science & Business Media, 2013. Halliday, D., Resnick, R., & Walker, J. “Fundamentals of physics extended”. John Wiley&Sons, 2010. Spiegel, M. “Schaum's outline of theory and problems of vector analysis and an introduction to tensor analysis”, 1974.				
<b>Online Resources</b> <a href="https://www.oreilly.com/library/view/beginning-math-and/0735713901/">https://www.oreilly.com/library/view/beginning-math-and/0735713901/</a> <a href="https://docs.unity3d.com/Manual/PhysicsSection.html">https://docs.unity3d.com/Manual/PhysicsSection.html</a>				
Outcome 1	Apply these concepts to solve equations, work with matrices and vectors, and grasp geometric transformations in various contexts.	K2		
Outcome 2	Apply advanced vector manipulation techniques and quaternion operations to effectively model and simulate complex spatial transformations in computer graphics and animation.	K3		
Outcome 3	Employ Newtonian and Lagrangian approaches to predict the motion of interconnected rigid bodies, illustrating the utility of Euler's equations in accurate motion description.	K3		
Outcome 4	Apply elasticity, stress, and strain concepts to assess mass-spring systems and deformation methods like control points, free-form, and implicit surfaces.	K3		
Outcome 5	Use strain, stress, and conservation laws to analyze fluid behavior, implement simplified 2D and 3D fluid flow models, and predict fluid flow patterns in various scenarios.	K4		

**Course Outcome VS Programme Outcomes**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	L(1)	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO2	S(3)	L(1)	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)	M(2)	L(1)	L(1)	M(2)	S(3)
CO4	S(3)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
CO5	S(3)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>1.4</b>	<b>1.6</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1.8</b>	<b>2.4</b>	<b>2.4</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

**Mapping Course Outcome VS Programme Specific Outcomes**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	M(2)	L(1)	M(2)	M(2)
CO2	S(3)	M(2)	L(1)	M(2)	S(3)
CO3	S(3)	M(2)	L(1)	M(2)	M(2)
CO4	S(3)	M(2)	L(1)	S(3)	M(2)
CO5	S(3)	M(2)	L(1)	M(2)	S(3)
<b>W.AV</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2.2</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

I-Semester				
<b>Course Code:</b> 83716C	<b>Elective -I</b> <b>Advanced Art for Game Character</b>	<b>T</b>	<b>Credits: 3</b>	<b>Hours: 3</b>
<b>Objective1</b>	<b>To provide a framework for artists to develop their skills and express themselves through their chosen medium, whether it's painting, drawing, sculpture, photography, digital art, or any other form of visual expression.</b>			
<b>Unit -I</b>	Observational Drawing: Develop Visual Perception, Contour Drawing, Value and Shading, Value and Shading, consistency, Subject Variety.			
<b>Unit - II</b>	Perspective Drawing: Understanding Perspective Systems, Creating Depth, Overlapping and Placement, Proportional Accuracy, Converging Lines, Foreshortening.			
<b>Unit - III</b>	Human Anatomy Study: Figure drawing basics, Essentials of human figure drawing, Proportion and Gesture, Simplifying body parts in to 2D shapes, Relative proportion of various parts of the body Constructing the front view using basic shapes, Stick figure, Line of action, Balance, Contour drawing(different poses), Cylindrical forms (front and side view), Foreshortening, Overlapping, Quick sketches, Study from live figure, Head study, Male and female, Hand and feet study.			
<b>Unit IV</b>	Color Theory: Understanding the Color Wheel, Color Mixing, Color Properties, Color Harmonies, Color Temperature, Color Psychology, Digital Color Theory, Practical Application.			
<b>Unit V</b>	Environmental Design: Conceptual Depth, Golden Ratio, Perspective, Understanding scale and proportion, Study of different environments, Understanding different materials and their applications, Application of texture and coloring in relation to the relevant subject.			
<b>Reference and Text Books:</b> Fava, M. (2011). What is the role of observational drawing in contemporary art & design curricula?. Graphicacy & Modelling Norman, E. & Seery, N.(Eds). Loughborough: IDATER, 129-141. Montague, J. (2013). Basic perspective drawing: a visual approach. John Wiley & Sons. Phillips, A. W., Smith, S. G., Ross, C. F., & Straus, C. M. (2012). Improved understanding of human anatomy through self-guided radiological anatomy modules. Academic Radiology, 19(7), 902-907. Agoston, G. A. (2013). Color theory and its application in art and design (Vol. 19). Springer. Guide, A. (2006). Environmental design. Chartered Institute of Building Services Engineers (CIBSE).				
<b>Online Resources</b> <a href="https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html">https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html</a> <a href="https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8">https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8</a> <a href="https://www.youtube.com/watch?v=BRk5WDWCyYM">https://www.youtube.com/watch?v=BRk5WDWCyYM</a> <a href="https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html">https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html</a>				
<b>Outcomes</b>				
CO1	Creating a visually compelling and authentic representation of the observed subject, while also allowing the artist's individual style and interpretation to shine through.			K1
CO2	It allows artists to create convincing and immersive visual experiences, making their artworks more dynamic and engaging.			K3&K6
CO3	Evaluating accurately represents the human form in your artwork. This includes capturing both the surface anatomy (muscles, skin, etc.) and the internal structures.			K4
CO4	Evaluate the develop a strong foundation in color theory, enabling you to use color purposefully and effectively in your creative endeavors and visual communication.			K5
CO5	Allows artists to connect deeply with the physical world and engage viewers in thought-provoking ways.			K2&K6
<b>Online Resources</b> <a href="https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html">https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html</a> <a href="https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8">https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8</a> <a href="https://www.youtube.com/watch?v=BRk5WDWCyYM">https://www.youtube.com/watch?v=BRk5WDWCyYM</a> <a href="https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html">https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html</a>				

**Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
CO2	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	M(2)	S(3)
CO4	L(1)	M(2)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	S(3)
CO5	L(1)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
<b>W.AV</b>	<b>1</b>	<b>2.5</b>	<b>1.4</b>	<b>2.5</b>	<b>1.8</b>	<b>1.6</b>	<b>1.8</b>	<b>2.4</b>	<b>1.6</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

**Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	L(1)	L(1)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	S(3)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	S(3)	S(3)	M(2)
CO5	L(1)	L(1)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>1</b>	<b>1.4</b>	<b>2.8</b>	<b>2.4</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

II-Semester				
Course Code 83721	2D Art	T	Credits: 4	Hours: 4
<b>Objective</b>	<ul style="list-style-type: none"> <li>● To introduce the concept of perspective views in art and design.</li> <li>● To help learners understand the essential aspects of figure drawing, including proportion, gesture, and the simplification of body parts into 2D shapes</li> <li>● To introduce learners to the core concepts and significance of design across creative disciplines.</li> <li>● To introduce learners to the concept of textures in visual design and art, emphasizing their role in creating depth and visual interest.</li> <li>● To provide an introduction to the field of concept art, emphasizing its role in visual development and creative processes.</li> </ul>			
<b>Unit - 1</b>				
<b>Perspective views :</b> Perspective views – types of perspective views – linear perspectives vs. aerial perspective – perspective terminology – horizon line/eye level , station point , picture plane , vanishing point – linear perspective construction				
<b>Unit - II</b>				
<b>Figure drawing basics :</b> Figure drawing basics – Essentials of human figure drawing – Proportion and Gesture - Simplifying body parts in to 2D shapes – Relative proportion of various parts of the body - Constructing the front view using basic shapes - stick figure – line of action – balance – contour drawing(different poses) – Cylindrical forms (front and side)				
<b>Unit - III</b>				
<b>Design fundamental:</b> Design fundamental - Characteristics of a good design - visual composition – Elements of design – Principles of Design - Gestalt principles - Visual Abstraction - Reducing Realism - Cognitive learning Model - Color theory - Attributes of Color - Color Wheel - Color Harmony - Color Schemes - Color Blending - Additive Model - Subtractive model - Color Contrast - Color Psychology -Typography - Classification - Type Families - Graphics - Types of Graphics				
<b>Unit IV</b>				
<b>Introduction to textures:</b> Introduction to textures – Types of texture – Understanding the foreground, mid ground and background color in textures – Useful tips on creating a texture - Creating texture using live reference.- Understanding scale and proportion - Study of different environment – Understanding different materials and their applications – Application of texture and coloring in relation to the relevant subject.				
<b>Unit-V</b>				
<b>Concept Art:</b> Concept Art - Introduction - Revisiting the basics - Styles - Cartoony, Realism and Hybrid - Environments - World Building - Architecture - Silhouettes - Character Sketching - Environment Sketching - Props and Weapon Design - Vehicle Design - Storytelling - Introduction - Elements of Story - Scenes - Types of Scenes - Scene Constructions - Script writing - Script formatting - Storyboards - Introduction - Shots - Transitions - Views				
<b>Reference and Text Books:</b>				
<ul style="list-style-type: none"> <li>● Feifer RG, Tazbaz D, “Interface design principles for interactive multimedia”, Telematics and Informatics, 1997. Fred T. Hofstetter, “Multimedia literacy”, Tata McGraw-hill, 2001.</li> <li>● Mark Elsom Cook, “Principles of Interactive Multimedia”, Tata McGraw-hill, 2001.</li> <li>● Moreno R, Mayer R. “Interactive multimodal learning environments”, Educational psychology review, 2007.</li> <li>● Tay Vaughan, “Multimedia making it work”, Tata McGraw-hill, Seventh Edition,</li> </ul>				

<b>Course Outcome:</b>		
<b>CO1</b>	<b>Gain proficiency in perspective-related terminology, including horizon line/eye level, station point, picture plane, and vanishing point, enabling effective communication and implementation of perspective techniques.</b>	<b>K1</b>
<b>CO2</b>	<b>Develop a strong foundation in human figure drawing, allowing participants to confidently represent the human form in various artistic and design contexts.</b>	<b>K3&amp;K6</b>
<b>CO3</b>	<b>Develop a strong foundation in design principles, enabling participants to create visually compelling and aesthetically pleasing compositions in various creative contexts.</b>	<b>K4</b>
<b>CO4</b>	<b>Develop a strong foundation in understanding and working with textures in visual design and art, enhancing participants' ability to create visually engaging compositions.</b>	<b>K5</b>
<b>CO5</b>	<b>Develop a strong foundation in concept art, understanding its significance in visual development and creative processes.</b>	<b>K2&amp;K6</b>

#### **Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
CO2	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	M(2)	S(3)
CO4	L(1)	M(2)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	S(3)
CO5	L(1)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
<b>W.AV</b>	<b>1</b>	<b>2.5</b>	<b>1.4</b>	<b>2.5</b>	<b>1.8</b>	<b>1.6</b>	<b>1.8</b>	<b>2.4</b>	<b>1.6</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

#### **Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	L(1)	L(1)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	S(3)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	S(3)	S(3)	M(2)
CO5	L(1)	L(1)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>1</b>	<b>1.4</b>	<b>2.8</b>	<b>2.4</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

II-Semester -Core				
Course Code - 83722	Advanced 3D Design Techniques	T	Credits: 4	Hours: 4
<b>Objective</b>	<ul style="list-style-type: none"> <li>● <b>Develop mastery in sculpting, non-destructive modeling, and mesh optimization to create intricate and optimized 3D models.</b></li> <li>● <b>Acquire the skills to achieve photorealism by creating advanced materials, implementing global illumination, and utilizing physically-based rendering.</b></li> <li>● <b>Attain expertise in character rigging, facial animation, and advanced animation principles for creating lifelike and expressive character animations.</b></li> <li>● <b>Learn techniques for crafting immersive visual experiences through advanced camera work, real-time visualization, and scene composition.</b></li> <li>● <b>Explore specialized areas including digital sculpture, VFX, and advanced texturing to expand creative possibilities and practical applications in 3D design.</b></li> </ul>			
<b>Unit - I</b>				
Advanced Modeling Techniques - Sculpting Tools - Organic Forms - Intricate Features - Surface Details - Introduction to Modifiers - Applying Modifier Stack - Non-Destructive Workflow - Parametric Adjustments - Importance of Retopology - Clean Edge Flow - Maintaining Deformation - Topology for Animation				
<b>Unit - II</b>				
Photorealistic Rendering - Understanding Material Realism - Physically Accurate Attributes - Layered Shaders - Mixing Textures and Effects - Radiosity and GI Basics - Soft Shadows - Shadow Types - Shadow Maps vs. Ray Tracing - Energy Conservation - Microfacet Theory - Albedo, Normal, Roughness - Metalness and AO Maps				
<b>Unit - III</b>				
Character Design and Animation - Joint Placement - Joint Hierarchies - IK and FK Controls - Facial Rig Controls - Blendshapes and Morph Targets - Creating Expressive Faces - Phonemes and Visemes - Syncing Animation to Audio - Secondary Motion - Hair and Cloth Dynamics - Anticipation and Follow-Through - Timing for Impact				
<b>Unit IV</b>				
Advanced Visualization and Presentation - Framing and Composition - Camera Movement - Interactive Environments - Lighting and Shading in Real Time - Rule of Thirds and Golden Ratio - Leading Lines and Depth - Emotion and Mood - Visual Narrative				
<b>Unit-V</b>				
Specialized Topics in 3D Design - High-Resolution Details - Digital Clay Techniques - Procedural Texture Generation - Displacement Mapping - Particle Systems - Fluid and Smoke Simulations - 3D Scanning and Reconstruction - Integrating Real-World Objects - Interactive 3D for Augmented Reality - Virtual Reality Scene Design				
<b>Reference and Text Books:</b>				
<ul style="list-style-type: none"> <li>● "Digital Sculpting with Mudbox" by Mike de la Flor (Sculpting)</li> <li>● "Procedural Generation in Game Design" by Tanya Short and Tarn Adams (Procedural Modeling)</li> <li>● "The Animator's Survival Kit" by Richard Williams (Facial Animation)</li> <li>● "The Five C's of Cinematography" by Joseph V. Mascelli (Cinematic Camera Techniques)</li> <li>● "Creating Textures with Substance Designer" by Daniel Thiger (Advanced Texturing)</li> </ul>				
<b>Online Resources</b>				
<ul style="list-style-type: none"> <li>● "PBR Guide" by Allegorithmic (Material Creation)</li> <li>● "Rigging 101" by Rigging Dojo (Character Rigging)</li> <li>● Unreal Engine's Official Documentation and Learning Resources (Real-Time Visualization)</li> <li>● "Introduction to Fluid Simulations in Houdini" by SideFX (VFX Integration)</li> </ul>				

<b>Course Outcome:</b>		
<b>CO1</b>	<b>Acquiring proficiency in crafting intricate 3D models, employing advanced sculpting, procedural modeling, and mesh optimization strategies.</b>	<b>K1</b>
<b>CO2</b>	<b>Students will achieve the ability to create renders of remarkable realism, mastering material generation, implementing global illumination, and applying the principles of physically-based rendering.</b>	<b>K3&amp;K6</b>
<b>CO3</b>	<b>Participants will cultivate expertise in character animation, rigging, and design, enabling them to develop characters with dynamic personas and lifelike motion across various media.</b>	<b>K4</b>
<b>CO4</b>	<b>Learners will skillfully construct immersive visual narratives, leveraging advanced camera techniques, real-time visualization tools, and effective composition methods.</b>	<b>K5</b>
<b>CO5</b>	<b>Explore niche domains within 3D design, including digital sculpting, advanced texturing techniques, and the seamless integration of visual effects, broadening their creative repertoire and practical proficiencies.</b>	<b>K2&amp;K6</b>

#### **Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	M(2)	M(2)	M(2)	S(3)	S(3)	L(1)	L(1)	L(1)	M(2)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)
CO4	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	S(3)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>1.6</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2</b>	<b>1.6</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

#### **Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	L(1)	L(1)	S(3)	M(2)	L(1)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)
CO3	M(2)	M(2)	S(3)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>1.6</b>	<b>1.8</b>	<b>2.6</b>	<b>2.2</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

II-Semester -Core				
Course Code - 83723	Specialized Game Engine-I	T	Credits: 4	Hours: 4
Objective	<ul style="list-style-type: none"> <li>• The module aims to introduce 3D game development, covering 2D vs. 3D concepts, 2D level design, transitioning to 3D, terrain design, and environment setup. Students will also learn about Profiler, Input Settings, prefabs, and tags, fostering skills for effective 3D game creation.</li> <li>• The objective is to equip students with essential 3D game scripting skills, including collision detection, event handling, optimization, raycasting, animation control, physics, and joint types, enabling them to create dynamic and interactive 3D game environments effectively.</li> <li>• To enable students to proficiently handle camera properties, GUI, and cinematic effects like rendering to texture, particle effects, and global illumination.</li> <li>• The objective is to equip students with the skills to design effective game UI, create layouts, incorporate information sharing through HUD, manage sound and music, understand networking concepts, prepare games for various platforms, and ensure code cleanliness for streamlined development.</li> <li>• The objective is to empower students with advanced gameplay programming skills, including event-driven systems, 2D game mechanics, basic AI mechanics, pathfinding, particle effects, audio integration, and dialog handling, while honing efficient build methods for comprehensive game development.</li> </ul>			
<b>Unit - 1</b>				
Introduction to 3D Game Development - Concepts of 2D vs 3D Game - 2D Level Design - Understanding the 3D Game World: screen dimensions - Convert screen positions to world positions - Terrain Design - Designing Level Maps - Setting up the Game Environment - Profiler Window: Input Settings, Console - Prefabs and Tags				
<b>Unit - II</b>				
Scripting: Basic 3D Methods - Collision Detection - Triggers - Controlling Game Objects Behavior: Rendering Mesh, Mesh filter - Event Handling: Mouse, Keyboard, Touch - Handling Frame Rate and performance - Namespaces, List Collections - Generic Functions - Coroutines and Exceptions - Raycasting - Navigation and Pathfinding - Working with Animation - Controlling Animation - 3D Physics - Joints - Types of Joints - Exploring different Colliders				
<b>Unit - III</b>				
Camera: Camera Properties, Lens Flare - GUI - Cinematics: Rendering to Texture - Particle Effects - Global Illumination - Rendering sky - Implementing render passes - Lighting, Shading - Occlusion Culling - Optimize event management - Check for memory leaks - Memory Optimization				
<b>Unit IV</b>				
Designing Game UI - Basic UI Layout - Designing Game UI - Information sharing to HUD - Sound and Music - Networking Concepts: server, host,spawn, Instantiate - Building for Different Platforms - Clean up code				
<b>Unit-V</b>				
Advanced Game play programming - Events and Actions - 2D Game Mechanics - Basic AI mechanics in games - Path finding - Particle Effects - Audio and Dialog handing - Build Methods				
<b>Reference and Text Books:</b>				
<ul style="list-style-type: none"> <li>• Alan Thorn, “UDK Game Development”, Course technology, 2012.</li> <li>• Aung Sithu Kyaw, Clifford Peters, Thet Naing Sw, Unity 4.x, 2013.</li> <li>• Deborah Todd, “Game Design: From Blue Sky to Green Light”, 2007.</li> <li>• Lee Zhi Eng, “Building a Game with Unity and Blender”, 2015.</li> <li>• Michelle Menard, “Game Development with Unity”, Course technology, 2012.</li> </ul>				
<b>Online Resources</b>				
<a href="https://docs.unity3d.com/Manual/index.html">https://docs.unity3d.com/Manual/index.html</a>				
<a href="https://forum.unity.com/">https://forum.unity.com/</a>				
<a href="https://assetstore.unity.com/">https://assetstore.unity.com/</a>				

<b>Course Outcome:</b>		
<b>CO1</b>	<b>Students will acquire the ability to differentiate between 2D and 3D game concepts, design 2D levels and transition to 3D environments, while also becoming skilled in tools like the Profiler and prefabs for proficient 3D game development.</b>	<b>K1&amp;K2</b>
<b>CO2</b>	<b>Master scripting techniques for 3D game development, including collision detection, event handling, raycasting, animation control, and 3D physics. Apply optimized frame rates, handle exceptions, utilize list collections, and navigate complex game environments using pathfinding and joint types.</b>	<b>K2</b>
<b>CO3</b>	<b>Utilizing camera properties, GUI, cinematic rendering, and global illumination, enhancing their ability to create visually compelling scenes. Implementing advanced rendering techniques, optimizing memory usage, and effectively managing events, resulting in improved performance and immersive 3D game experiences.</b>	<b>K4</b>
<b>CO4</b>	<b>Designing functional game UI, implementing HUD for information sharing, managing sound, and comprehending networking concepts for interactive and platform-ready game development.</b>	<b>K5</b>
<b>CO5</b>	<b>Proficiency in advanced gameplay programming, including event-driven systems, 2D game mechanics, basic AI mechanics, and pathfinding.</b>	<b>K6</b>

#### **Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2</b>	<b>1</b>	<b>2.8</b>	<b>2.4</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>	<b>1.8</b>	<b>2.4</b>	<b>2.8</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

### Mapping Course Outcome VS Programme Specific Outcomes

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2.8</b>	<b>2.6</b>	<b>2.8</b>	<b>2.4</b>	<b>2.8</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

II-Semester -Core					
Core	Course Code-83724	WEB GAME PROGRAMMING-PRACTICAL	P	Credits:4	Hours: 4
Objectives	<ul style="list-style-type: none"> <li>➤ Acquire hands-on experience in mobile game development through practical projects.</li> <li>➤ Enhance web game development skills by creating interactive and engaging games.</li> <li>➤ Develop a strong understanding of fundamental game mechanics and their implementation.</li> <li>➤ Explore various game design principles and techniques to create enjoyable gaming experiences.</li> <li>➤ Build a solid foundation in programming and problem-solving by creating diverse types of games.</li> </ul>				
<ol style="list-style-type: none"> <li>1. Develop a simple quiz application</li> <li>2. Create a canvas and demonstrate parallax scrolling</li> <li>3. Develop a simple game and demonstrate player movement and collision detection.</li> <li>4. Define different types of collision detection methods and demonstrate them using html5 canvas.</li> <li>5. Create a Simple Click to Shoot game.</li> </ol>					
Outcomes	<ul style="list-style-type: none"> <li>➤ Attain proficiency in developing mobile and web games, showcasing practical skills in game design and programming.</li> <li>➤ Exhibit creativity by designing diverse game concepts, fostering imaginative game mechanics and experiences.</li> <li>➤ Strengthen problem-solving abilities through tackling challenges in game development, fostering critical thinking and analytical skills.</li> <li>➤ Create engaging and interactive game environments, demonstrating an understanding of user experience and interface design.</li> <li>➤ Generate a comprehensive portfolio of varied game projects, illustrating competence and versatility in game development to potential employers or educational pursuits.</li> </ul>				

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO4	M(2)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>1.6</b>	<b>3</b>	<b>1.6</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	S(3)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)
CO4	M(2)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.6</b>	<b>2.6</b>	<b>2</b>	<b>2.4</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

II-Semester -Core				
<b>Course Code-83725</b>	<b>Specialized Game Engine I - Practical</b>	<b>P</b>	<b>Credits: 4</b>	<b>Hours: 8</b>
<b>Objectives</b>	<b>Develop a game from start to finish, covering various game development aspects. Apply level design principles, environmental elements, and player interactions.</b>			
<b>Exercise:</b> The students are expected to complete the following exercise and submit the record work 1. Create a terrain using game engine 2. Create a First Person Shooter level 3. Import custom models from a design tool to game engine 4. Import animated character and use it in your level 5. Create a new GUI and HUD for your game and import it in game engine 6. Create a 2D character for a 2D casual game 7. Import 2D character to use it inside your game 8. Make a side scrolling game				
<b>Outcome</b>	<ul style="list-style-type: none"> <li>● <b>Crafted immersive FPS gameplay with dynamic terrains, custom assets, and animations, enhanced by a new GUI/HUD.</b></li> <li>● <b>Designed captivating 2D characters and side-scrolling mechanics, resulting in engaging games with distinct visuals and interactions</b></li> </ul>			<b>K4</b>

#### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2</b>	<b>1</b>	<b>2.8</b>	<b>2.4</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>	<b>1.8</b>	<b>2.4</b>	<b>2.8</b>

S–Strong (3), M-Medium (2), L-Low (1)

#### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2.8</b>	<b>2.6</b>	<b>2.8</b>	<b>2.4</b>	<b>2.8</b>

S–Strong (3), M-Medium (2), L-Low (1)

II-Semester - Elective-II				
Course Code - 83726A	Elective-II	T	Credits: 3	Hours: 3
	<b>1. Game Engine Specialization</b>			
<b>Objective</b>	<ul style="list-style-type: none"> <li>● Learn the evolution, types, and importance of game engines while navigating a popular engine's interface. Acquire foundational skills in managing game elements, scripting interactivity, and shaping gameplay mechanics for an immersive introduction to game development.</li> <li>● Attain expertise in crafting 3D terrains, environments, and assets while optimizing models, textures, and materials. Develop an understanding of environmental design principles, composition techniques, and physics-based collision detection to create captivating game worlds.</li> <li>● Develop fluency in designing compelling game mechanics encompassing player controls, character movement, and camera systems, while gaining hands-on experience in integrating interactive elements like enemies, collectibles, and triggers.</li> <li>● Attain an in-depth understanding of advanced graphics by exploring shader fundamentals, materials, rendering techniques, and integrating dynamic visual effects like particle systems.</li> <li>● Develop proficiency in testing, debugging, and optimizing games for diverse platforms, culminating in the successful deployment and distribution of standalone builds across online platforms.</li> </ul>			
<b>Unit - 1</b>				
<b>Introduction to Game Engines and Fundamentals:</b> Understanding game engines - history - types and significance - Exploring the interface of a popular game engine - Fundamentals of game objects - assets - scenes - components - Basic scripting for interactivity - gameplay mechanics				
<b>Unit - II</b>				
<b>3D World Creation and Design :</b> Creating terrains - landscapes and environments - Asset import and optimization - models - textures - materials - and lighting - Environmental design principles - level composition - Introduction to physics - collision detection .				
<b>Unit - III</b>				
<b>Gameplay Mechanics and Interactivity:</b> Game mechanics - player controls - character movement - camera systems - Implementing gameplay elements - enemies - collectibles - triggers - Scripting - interactions using visual scripting - programming languages - Basic AI scripting for NPCs and enemies				
<b>Unit IV</b>				
<b>Advanced Graphics and Animation:</b> Shader basics - materials - shaders and rendering techniques - Animation systems - rigging - character animation - state machines - Integrating particle systems - visual effects - Optimizing graphics for performance across different platforms				
<b>Unit-V</b>				
<b>User Interface, Sound, and Project Deployment:</b> Designing and implementing user interfaces (UI) - heads-up displays (HUD) - Integrating audio - sound effects - music - spatial audio techniques - Testing - debugging - optimizing the game for various platforms - Project deployment - distribution - standalone builds - online platforms				
<b>Reference and Text Books:</b>				
<ul style="list-style-type: none"> <li>● "Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#" by Jeremy Gibson Bond</li> <li>● Unity in Action: Multiplatform Game Development in C#" by Joe Hocking</li> <li>● "Game Programming Patterns" by Robert Nystrom</li> <li>● Physics for Game Developers" by David M. Bourg and Bryan Bywalec</li> </ul>				
<b>Online Resources</b>				
<a href="https://learn.unity.com/">https://learn.unity.com/</a>				
<a href="https://forum.unity.com/">https://forum.unity.com/</a>				
<a href="https://assetstore.unity.com/">https://assetstore.unity.com/</a>				

<b>Course Outcome:</b>		
<b>CO1</b>	<b>Mastery of diverse game engine types and their impact, coupled with practical proficiency in creating and scripting game objects, scenes, and mechanics, empowering effective engagement with game development tools.</b>	<b>K1&amp;K2</b>
<b>CO2</b>	<b>Proficiency in designing diverse 3D terrains, landscapes, and assets, combined with the ability to optimize models, textures, and lighting for enhanced visual appeal. A solid grasp of environmental design principles, level composition techniques, and physics-based collision detection, enabling the creation of immersive and interactive game environments.</b>	<b>K2</b>
<b>CO3</b>	<b>Proficient ability to design and implement engaging game mechanics, including player controls, character movement, and interactive elements like enemies and collectibles. Mastery of scripting interactions through visual and programming languages, coupled with a fundamental understanding of basic AI scripting, resulting in dynamic and captivating gameplay experiences.</b>	<b>K4</b>
<b>CO4</b>	<b>Proficiency in leveraging shader techniques, rendering, and visual effects for creating visually stunning game environments, complemented by mastery of animation systems including rigging and character animation. Ability to optimize graphics for diverse platforms, ensuring smooth and immersive gameplay experiences with enhanced graphical fidelity.</b>	<b>K5</b>
<b>CO5</b>	<b>Adeptness in designing user-friendly interfaces and immersive HUDs, coupled with seamless integration of audio elements and optimization techniques. Proficiency in testing, debugging, and successfully deploying games across various platforms, showcasing polished standalone builds on online distribution platforms.</b>	<b>K6</b>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2</b>	<b>1</b>	<b>2.8</b>	<b>2.4</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>	<b>1.8</b>	<b>2.4</b>	<b>2.8</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2.8</b>	<b>2.6</b>	<b>2.8</b>	<b>2.4</b>	<b>2.8</b>

S–Strong (3), M-Medium (2), L-Low (1)

**II-Semester - Elective-II**

<b>Course Code- 83726B</b>	<b>Elective-II 2. GAME LEVEL DESIGNING</b>	<b>T</b>	<b>Credits: 3</b>	<b>Hours: 3</b>
<b>Objective</b>	<ul style="list-style-type: none"> <li>● <b>Gain a foundational understanding of game level design principles, the role of level designers, and the analysis of successful game levels.</b></li> <li>● <b>Develop skills in spatial design, creating balanced gameplay spaces, and applying structural storytelling techniques.</b></li> <li>● <b>Learn to infuse narrative elements into environments, evoke mood and emotion through design, and prioritize player-centered engagement.</b></li> <li>● <b>Acquire proficiency in designing challenges, pacing, interactive elements, and feedback systems for dynamic gameplay experiences.</b></li> <li>● <b>Master rapid prototyping, iterative playtesting, level optimization for performance, and the creation of a compelling level design portfolio.</b></li> </ul>			
<b>UNIT - 1</b>				
<b>Fundamentals of Game Level Designing:</b> Importance of Game Levels - Gameplay and Level Design - Evolution of Level Design - Player-Centric Design - Flow and Pacing - Spatial Design and Layout - Environmental Storytelling - Navigation and Wayfinding - Balancing Challenges and Progression - Difficulty Curves and Dynamic Adjustments - Reward Structures and Motivation				
<b>UNIT-II</b>				
<b>Level Layout and Flow:</b> Balance, contrast, scale, and rhythm - Integrating real-world design concepts - World Building - Lighting - Color Schemes - Narrative Integration - Spatial Design - Flow, Variety - "Three-Act Structure" - Story, Pacing				
<b>UNIT-III</b>				
<b>Environmental Storytelling and Engagement:</b> Storytelling - Narrative Elements - Props, Hidden - Mood and Emotion - Atmosphere - Player-Centric Design - Experience, Balance				
<b>UNIT-IV</b>				
<b>Gameplay Mechanics and Interactivity:</b> Mechanics - Challenges - Balancing, Pacing - Interactivity - Feedback, Rewards				
<b>UNIT-V</b>				
<b>Level Prototyping, Optimization, and Portfolio:</b> Rapid Prototyping - Playtesting, Iteration - Performance Optimization - Efficiency - Portfolio and Career - Showcasing, Paths				
<b>Reference and Text Books:</b>				
<ul style="list-style-type: none"> <li>● "The Art of Game Design: A Book of Lenses" by Jesse Schell</li> <li>● "The Design of Everyday Things" by Don Norman</li> <li>● "Designing with Pixar: 45 Activities to Create Your Own Characters, Worlds, and Stories" by John Lasseter</li> <li>● "The Art of Game Design: A Deck of Lenses" by Jesse Schell</li> <li>● "Level Up! The Guide to Great Video Game Design" by Scott Rogers</li> </ul>				
<b>Online Resources</b>				
<ul style="list-style-type: none"> <li>● Extra Credits (YouTube channel on game design concepts)</li> <li>● "Flow in Games" by Jenova Chen (TED Talk)</li> <li>● GDC Vault (Website with conference presentations on game development)</li> <li>● "Understanding Gameplay" by Mark Brown (YouTube series)</li> <li>● "The GameDev Business Handbook" by Mike Rose</li> </ul>				

<b>Course Outcome:</b>		
<b>CO1</b>	<b>Understand the foundational principles of game level design, recognize the role of a level designer, and evaluate successful game levels.</b>	<b>K2&amp;K3</b>
<b>CO2</b>	<b>Develop the ability to create well-balanced gameplay spaces, implement the "Three-Act Structure" effectively, and understand the importance of spatial design.</b>	<b>K3</b>
<b>CO3</b>	<b>Gain skills in integrating narrative elements into environments, evoking emotions through level design, and prioritizing player immersion.</b>	<b>K4</b>
<b>CO4</b>	<b>Acquire expertise in designing engaging challenges, optimizing pacing, implementing interactive elements, and creating effective feedback systems.</b>	<b>K4</b>
<b>CO5</b>	<b>Master the art of rapid prototyping, conduct iterative playtesting, optimize levels for performance, and compile a compelling level design portfolio for professional advancement.</b>	<b>K5</b>

#### **Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

#### **Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

II-Semester - Elective-II				
Course Code- 83726C	Elective-II 3. Shader Programming	T	Credits: 3	Hours: 3
<b>Objective</b>	<ul style="list-style-type: none"> <li>• Understand the role of shaders in graphics programming, shading languages, and different types of shaders.</li> <li>• Explore uniforms, built-in variables, functions, and the process of creating, compiling, and running shader programs.</li> <li>• To educate lighting principles, surface normals, different types of lights, and effects like cartoon shading and fog.</li> <li>• Familiarize texture mapping techniques, different types of textures, and image-based lighting.</li> <li>• Understand image manipulation operations, filters, and various shader effects</li> </ul>			
<b>UNIT - 1</b>				
Shaders - Introduction - Applications - Shading Languages - GLSL - Introduction - Types of Shaders - Vertex Shaders - Geometry Shaders - Fragment Shaders - Tessellation Shaders - Primitive Shaders - Vertex Data - Vertex Attributes - Vertex Arrays - Fragment Data.				
<b>UNIT-II</b>				
Uniforms - Built in variables - Build in Functions - Creating Shader Program - Running the Shader - Shader Compilation & Linking - Algorithmic Drawing - Matrices - Shapes - Colors - Transformations - Translations - Animation - Depth Buffering				
<b>UNIT-III</b>				
Lighting - Lighting Principles - Surface Normals - Light Normals - Light Material - Multiple Positional Lights - Directional Light - Spot Light - Cartoon Shading Effect - Fog Effects				
<b>UNIT-IV</b>				
Textures - Image Operations - Texture Mapping - Texture Objects - Multiple Textures - Alpha Maps - Normal Maps - Cube Maps - Image based Lighting - Mipmap - Projected Texture				
<b>UNIT-V</b>				
Image Operations - Filters - Edge Detection Filter - Gaussian Blur Effect - Bloom effect - Gamma Corrections - Anti aliasing - Mesh Shader - Smoothing - Silhouette Effects - Reflection Map - Bump Map				
<b>Reference and Text Books:</b>				
<ul style="list-style-type: none"> <li>• "OpenGL Shading Language" by Randi J. Rost -UNIT-I</li> <li>• "OpenGL SuperBible: Comprehensive Tutorial and Reference" by Graham Sellers, Richard S. Wright Jr., and Nicholas Haemel- UNIT-II</li> <li>• "Real-Time Rendering, Fourth Edition" by Tomas Akenine-Möller, Eric Haines, Naty Hoffman- UNIT-III</li> <li>• "OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5" by Dave Shreiner, Graham Sellers, John M. Kessenich, Bill M. Licea-Kane - UNIT-IV</li> <li>• "OpenGL Insights" edited by Patrick Cozzi and Christophe Riccio - UNIT-V</li> </ul>				
<b>Online Resources</b>				
<ul style="list-style-type: none"> <li>• <a href="https://www.gamedeveloper.com/">https://www.gamedeveloper.com/</a></li> <li>• <a href="https://www.worldofleveldesign.com/">https://www.worldofleveldesign.com/</a></li> <li>• <a href="https://www.gamedev.net/">https://www.gamedev.net/</a></li> </ul>				

<b>Course Outcome:</b>		
<b>CO1</b>	<b>Able to differentiate between vertex, geometry, fragment, tessellation, and primitive shaders, and grasp the concept of vertex attributes and arrays for rendering graphics.</b>	<b>K2&amp;K3</b>
<b>CO2</b>	<b>To apply uniforms, use built-in variables and functions, create and run shader programs, and understand how matrices, shapes, colors, transformations, translations, and animations are applied in shader-based rendering.</b>	<b>K3</b>
<b>CO3</b>	<b>To apply lighting concepts, calculate normals, implement multiple lights including directional and spot lights, and create special effects like cartoon shading and fog in graphics scenes.</b>	<b>K4</b>
<b>CO4</b>	<b>Able to use textures, implement techniques like texture mapping, alpha maps, normal maps, and cube maps, and understand the concept of image-based lighting and mipmap generation.</b>	<b>K4</b>
<b>CO5</b>	<b>To apply filters, create shader effects, and understand advanced graphics techniques.</b>	<b>K5</b>

#### Course Outcome VS Programme Outcomes

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)	L(1)
CO2	M(2)	L(1)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	L(1)	L(1)
CO3	M(2)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO5	S(3)	L(1)	S(3)	S(3)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
<b>W.AV</b>	<b>2.4</b>	<b>2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>1.6</b>	<b>1.2</b>	<b>1.2</b>

S–Strong (3), M–Medium (2), L–Low (1)

#### Mapping Course Outcome VS Programme Specific Outcomes

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	M(2)	M(2)	L(1)	L(1)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>1.8</b>	<b>2</b>	<b>1.6</b>	<b>1.6</b>	<b>2</b>

S–Strong (3), M–Medium (2), L–Low (1)

**II-Semester - NME - I**

<p><b>Course Code- 83727A</b></p>	<p align="center"><b>Non Major Elective-I 1. Digital Cinematography Practical</b></p>	<p align="center"><b>P</b></p>	<p align="center"><b>Credits: 2</b></p>	<p align="center"><b>Hours: 3</b></p>
<p><b>Objectives</b></p>	<ul style="list-style-type: none"> <li>➤ Understand the foundational elements of cinematic design in games, including camera movements, animations, dialogue, and environmental cues.</li> <li>➤ Apply interactive narrative techniques by developing dialogue systems that allow players to make choices influencing the outcomes of cinematic sequences.</li> <li>➤ Demonstrate the ability to design and implement dynamic camera systems that automatically follow characters during gameplay to enhance storytelling and immersion.</li> <li>➤ Create game environments enriched with visual cues and elements that communicate narrative context, creating a more immersive and engaging storytelling experience.</li> <li>➤ Develop the skills to craft time-lapse cinematics depicting the passage of time or implementing triggered cinematics that respond to specific in-game conditions, effectively enhancing narrative and player engagement.</li> </ul>			
<ol style="list-style-type: none"> <li>1. <b>Cinematic Cutscene:</b> Create a cinematic cutscene that introduces a game's story or characters using camera movements, animations, and dialogue.</li> <li>2. <b>Dialogue Interaction:</b> Develop an interactive dialogue system where players can choose responses that affect the outcome of a cinematic sequence.</li> <li>3. <b>Dynamic Camera Sequences:</b> Design a dynamic camera system that follows characters during gameplay, enhancing immersion and storytelling.</li> <li>4. <b>Environmental Storytelling:</b> Construct an environment with visual cues and elements that convey a narrative without relying on direct dialogue or exposition.</li> <li>5. <b>Time-Lapse Sequences:</b> Craft time-lapse cinematics that showcase the passage of time, such as day-night cycles or the growth of a structure.</li> <li>6. <b>Event Triggered Cutscenes:</b> Implement scripted events that trigger cinematic sequences when specific in-game conditions are met.</li> <li>7. <b>Narrative Puzzles:</b> Create puzzle-based cinematics where players must solve challenges in the environment to advance the cinematic story.</li> <li>8. <b>Flashbacks and Memories:</b> Design cinematics that transport players into the past, offering insight into a character's backstory or crucial events.</li> <li>9. <b>Parallel Storylines:</b> Develop cinematics that showcase parallel storylines occurring simultaneously in different parts of the game world.</li> <li>10. <b>Endings and Epilogues:</b> Design impactful cinematics that provide closure to the game's story, offering players a satisfying conclusion.</li> </ol>				
<p><b>Outcomes</b></p>	<ul style="list-style-type: none"> <li>➤ To demonstrate proficiency in designing and creating cinematic cutscenes, incorporating camera movements, animations, and dialogue to effectively convey the game's story and characters.</li> <li>➤ To develop the ability to design and implement interactive dialogue systems that allow players to make choices influencing the outcomes of cinematic sequences, enhancing player engagement and immersion.</li> <li>➤ Gain the skill to design and apply dynamic camera systems that automatically follow characters during gameplay, contributing to a more immersive and visually engaging player experience.</li> <li>➤ To construct game environments with visual cues and elements that convey narrative context without relying on direct exposition, contributing to a richer and more immersive storytelling experience.</li> <li>➤ Develop the capability to craft time-lapse cinematics showcasing the passage of time or triggering scripted events in response to specific in-game conditions, enhancing storytelling and player engagement</li> </ul>			

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)
CO3	M(2)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	M(2)	L(1)	L(1)
CO4	M(2)	M(2)	L(1)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>1.6</b>	<b>1.6</b>	<b>1</b>	<b>2.2</b>	<b>1.4</b>	<b>1.2</b>	<b>1.4</b>	<b>1.6</b>	<b>1.6</b>	<b>1.6</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.2</b>	<b>2</b>	<b>2.4</b>	<b>2.2</b>

S–Strong (3), M-Medium (2), L-Low (1)

**II-Semester - NME - I**

<b>Course Code</b> - 83727B	<b>Title of the Course</b>	<b>Non Major Elective - I</b> <b>2. 2D Animation Techniques</b>	<b>P</b>	<b>Credits: 2</b>	<b>Hours: 3</b>
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**Objective:**

**"Mastering 2D animation techniques to create captivating and expressive storytelling through motion and character design."**

**Students are required to create storyboard, and design for the following:**

1. Create sketches and make a character turnaround sheet
2. Digitalise the character sketch and prepare it for computer animation.
3. Create an appealing two leg walk cycle for a boy cartoon character
4. Use the concept of panning and zooming to make the walk cycle realistic
5. Create a lip sync and make character acting animation

**Outcome:**

**"Achieving seamless and immersive 2D animations that resonate with viewers, while expanding opportunities in the animation industry."**

**Reference and Text Books:**

1. Bill Davis, "Creating 2D animation in a small studio", GGC Publishing, 2006
2. Hedley Griffin, "The Animator's Guide to 2D Computer Animation", Focal Press, 2000
3. Sandro Corsaro and Clifford J. Parrott, "Hollywood 2D Digital Animation: The New Flash Production Revolution", Course Technology PTR; 1 edition, 2004
4. Steve Roberts, "Character Animation: 2D Skills for Better 3D", Focal Press; Second edition, 2007
5. Tony White, "Animation from Pencils to Pixels: Classical Techniques for the Digital Animator", Focal Press; 1 edition, 2006

**Online Resources**

1. <http://animationresources.org/>
2. <https://www.animationmentor.com/>
3. <http://theanimatorsclub.com/>
4. <http://tvpaint.com/>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	L(1)	L(1)	L(1)
CO2	L(1)	M(2)	M(2)	S(3)	L(1)	M(2)	L(1)	M(2)	L(1)	L(1)
CO3	L(1)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)
CO4	L(1)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)
CO5	L(1)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
<b>W.AV</b>	<b>1</b>	<b>2.2</b>	<b>2.6</b>	<b>2.8</b>	<b>1.6</b>	<b>2</b>	<b>1.6</b>	<b>2</b>	<b>1.2</b>	<b>1.6</b>

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	S(3)	M(2)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	M(2)	M(2)	S(3)	S(3)	M(2)
CO5	M(2)	M(2)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>1.4</b>	<b>1.4</b>	<b>3</b>	<b>2.4</b>	<b>2.2</b>

S–Strong (3), M-Medium (2), L-Low (1)

**II-Semester - NME - I**

<b>Course Code</b> - 83727C	<b>Title of the Course</b>	<b>Non Major Elective - I</b> <b>3. Graphic Designing</b>	<b>P</b>	<b>Credits: 2</b>	<b>Hours: 3</b>
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**Objective:**

**"To deliver compelling and effective graphic designs that elevate brand messaging and engage audiences through innovative creativity and technical proficiency."**

**Students are required to create storyboard, and design for the following:**

1. Create a social media post design for a product or a company.
2. Create a brand and marketing collateral design for a company or product.
3. Design a brochure or a product catalog
4. Create a leaflet for a furniture brand that would be distributed to prospective customers in an exhibition
5. Create a newsletter that promotes various products for Diwali.
6. Design a Vector Portrait Illustration
7. Design a Packaging Design for a Product
8. Create a Restaurant Menu Design
9. Design a Banner Ads for Online Promotion
10. Design a Book Cover Illustration

**Outcome:**

**"To deliver compelling and effective graphic designs that elevate brand messaging and engage audiences through innovative creativity and technical proficiency."**

**Reference and Text Books:**

- Adobe, " Adobe Illustrator CC Classroom in a Book " , Pearson Education India 1 edition 2014
- Alina Wheeler, " Designing Brand Identity: An Essential Guide for the Whole Branding Team " , Wiley; 5 edition (October 16, 2017)
- Faulkner Andrew, Chavez Conrad, " Adobe Photoshop CC Classroom in a Book, Pearson Education" First edition 2017
- James Craig , Irene Korol Scala, " Designing with Type, 5th Edition: The Essential Guide to Typography " , Watson-Guptill; 5th ed. edition (May 1, 2006)
- Kordes Anton Kelly, Cruise John, "Adobe InDesign CC Classroom in a Book", Pearson Education; First edition 2017

**Online Resources**

<https://www.youtube.com/watch?v=rflq1Szc2j4>

<https://www.youtube.com/watch?v=yad3GOnVw5c>

<https://www.youtube.com/watch?v=9EGI-FSr0Ig>

<https://www.youtube.com/watch?v=vAG-CElu7ck>

<https://www.youtube.com/watch?v=INOqIS5X1GU>

<https://www.youtube.com/watch?v=NZmny1RT2R8>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	S(3)
CO2	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)
CO4	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)
CO5	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
<b>W.AV</b>	<b>1</b>	<b>3</b>	<b>1.4</b>	<b>2.8</b>	<b>1.5</b>	<b>1.8</b>	<b>1.5</b>	<b>1.6</b>	<b>1.6</b>	<b>2.8</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	M(2)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	M(2)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	L(1)	M(2)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>1</b>	<b>1.8</b>	<b>1.6</b>	<b>2.2</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

### III– Semester- Core

Core	Course Code- 83731	Specialized Game Engine - II	T	Credits: 4	Hours: 4
Objectives	<ul style="list-style-type: none"> <li>● To understand the essential concepts and tools of game engine usage, including installation, asset creation, and basic scene manipulation.</li> <li>● To learn advanced game development techniques: terrain creation, visual effects, cinematic production, audio integration, and optimization.</li> <li>● Gain expertise in blueprint scripting for game mechanics, AI, and UI design, along with packaging and exporting games.</li> <li>● Attain proficiency in VFX, mechanics, abilities, UI, and level design within game development.</li> <li>● Attain proficiency in game development through the creation of enemy AI, level design, interactive elements, UI, and lighting.</li> </ul>				
UNIT-I	<p><b>Introduction to Game Engine:</b> Installation Process - Project Creation - User Interface Overview- Transform tools - Primitive Geometry - Geometry Editing - Introduction to content browser - BSPSurface - Static Mesh.</p> <p><b>Introduction to lighting:</b> Importing custom static mesh - Creating Material - Diffuse Texture - Landscape Editing Basics.</p>				
UNIT-II	<p><b>Importing and Using Height maps:</b> Terrain Material, Using The Foliage Editor - Normal Maps - emissive Maps - Decals and Opacity masks - Vertex painting, Using Video Texture.</p> <p><b>Introduction to sound:</b> Destruction Meshes - Matinee - Introduction-Creating Cinematic and cut scene - Using Particle Systems - Matinee soundtracks - Matinee Skeletal Mesh Animation - Fade Director Tracks - Audio Master Tracks - Volume Introduction - Post Processing - Level Streaming Quick Start - Creating Prefab- Creating Water with Swimming Feature.</p>				
UNIT-III	<p><b>Introduction to blueprint:</b> Blueprint classes - Blueprint input key binding - Blueprint VariableTypes and Math Functions - How To Create AI And Enemy Basics - Setting Up AI Roaming and Destinations-Health System.</p> <p><b>Introduction To UI Widgets:</b> Creating A HUD - Creating HUD Bindings - Basic UM GUI Animation - Floating UI Widget Component - Loading Screens - Main Menu - Styling MainMenu- Adding Main Menu Functionality - Gamepad Inputs - Showing Game Mouse Cursor - PauseMenuFunctionality - Styling Pause Menu - Packaging and Export - Settings</p>				
UNIT-IV	<p><b>Cascade VFX:</b> Spark Emitter - Cascade GPU Sprites - Cascade Mesh Emitters - Save/Load Game - SaveGame Data - Check Point System - Teleporting Players - Side Scroller Game - Basic Mechanics and Health - Working on The Fuel System - The Health bar - The Fuel Bar - Pickup Items.</p> <p><b>Game Countdown Timer:</b> Speed Boost Ability - Gravity Boost Ability - Slow Motion Ability - Level CompleteScreen - Time Up Screen -Death Animation and Function - Exploding Obstacle - Damaging Player WithFire - Low Health Vignette Effect - Opening Door With Key - Coin Pickup and Counter - MainMenu - Level Selection - Ability Cool Down System - Animated Cool Down Timer</p>				
UNIT-V	<p><b>Creating Basic Enemy Bot AI:</b> Regenerating Health System - Blocking Out The Level - Creating a moving Platform - Crushing Pillar - Using Structural Meshes - Decorating Our Level - Ability Popup Messages - Animated Popup Messages - Death / Game Over Screen - Lighting Our Level - Creating the Flashlight - Adding The Battery - Cleaning Up Our Blueprints.</p>				

#### Reference and Text Books:

- Alan Thorn, “UDK Game Development”, Course technology, 2012.
- Lee, J, “Learning Unreal Engine Game Development”, Packt Publishing Ltd, 2016.
- Plowman, J, “3D game design with Unreal Engine 4 and Blender”, PacktPub, 2016.
- Sathesh, P. V, “Unreal Engine 4 Game Development Essentials”, Packt Publishing Ltd, 2016.
- Thomas Mooney, “Unreal Development Kit Game Design Cookbook”, Packt PublishingLtd, 2012

#### Online Resources

- <https://www.unrealengine.com/en-US/learn>

Course Outcomes		Knowledge level
CO-1	Able to navigate the game engine interface, create and modify basic game assets, and explain the significance of different components within a game development environment.	K1&K2
CO-2	Showcase proficiency in height maps, material creation, visual enhancements, cinematic sequencing, audio integration, ParticleSystems, level optimization, and water mechanics for game development.	K2
CO-3	Students will proficiently create blueprints, design AI behaviors, craft UI elements, and package/export functional game projects using blueprint scripting.	K4
CO-4	To design VFX using Cascade, implement game mechanics like abilities and pickups, create engaging UI elements including timers and counters, and construct well-structured levels with interactive features.	K5
CO-5	Implement basic enemy AI, design interactive levels with moving platforms and hazards, integrate UI elements like ability and popup messages, apply dynamic lighting, and manage blueprint organization.	K6

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	L(1)	M(2)	S(3)	S(3)
CO4	S(3)	M(2)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
W.AV	3	2.2	3	2.4	3	3	1.8	2	3	3

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	L(1)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	3	1.8	3	3

S–Strong (3), M-Medium (2), L-Low (1)

III-Semester - Core					
Core	Course Code- 83732	ADVANCED MOBILE GAME DEVELOPMENT	P	Credits: 4	Hours: 4
<b>Unit -I</b>					
<b>Objectives</b>	<ul style="list-style-type: none"> <li>➤ Acquire hands-on experience in mobile game development through practical projects.</li> <li>➤ Enhance web game development skills by creating interactive and engaging games.</li> <li>➤ Develop a strong understanding of fundamental game mechanics and their implementation.</li> <li>➤ Explore various game design principles and techniques to create enjoyable gaming experiences.</li> <li>➤ Build a solid foundation in programming and problem-solving by creating diverse types of games.</li> </ul>				
<ol style="list-style-type: none"> <li>1. Develop a clone of the popular Flappy Bird game where the player controls a character by tapping the screen to make it jump and navigate through obstacles.</li> <li>2. Build a memory matching game where the player flips over cards to find matching pairs within a grid.</li> <li>3. Create a sliding puzzle game where the player rearranges pieces of an image to complete it.</li> <li>4. Develop a classic brick-breaking game where the player controls a paddle to bounce a ball and break bricks.</li> <li>5. Design an endless runner game where the player's character automatically moves forward, and the player must swipe to avoid obstacles and collect items.</li> </ol>					
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>● Attain proficiency in developing mobile and web games, showcasing practical skills in game design and programming.</li> <li>● Exhibit creativity by designing diverse game concepts, fostering imaginative game mechanics and experiences.</li> <li>● Strengthen problem-solving abilities through tackling challenges in game development, fostering critical thinking and analytical skills.</li> <li>● Create engaging and interactive game environments, demonstrating an understanding of user experience and interface design.</li> <li>● Generate a comprehensive portfolio of varied game projects, illustrating competence and versatility in game development to potential employers or educational pursuits.</li> </ul>		K6		

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO4	M(2)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>1.6</b>	<b>3</b>	<b>1.6</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	S(3)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)
CO4	M(2)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.6</b>	<b>2.6</b>	<b>2</b>	<b>2.4</b>	<b>3</b>

S–Strong (3), M-Medium (2), L-Low (1)

III– Semester- Core					
Core	Course Code- 83733	Emerging Technologies in Game Development	T	Credits:	Hours:
				4	4
Objectives	<ul style="list-style-type: none"> <li>Understand VR goals, definitions, hardware, sensation and perception, geometric modeling, and transformation concepts.</li> <li>To learn axis-angle representations, quaternions, homogeneous transformations, and viewing transforms.</li> <li>Explore light interpretation, refraction, depth perception, motion perception, orientation tracking, and correction techniques.</li> <li>To educate AR classification, image acquisition, feature extraction, matching, and verification techniques.</li> <li>Understand IoT concepts, sensing, actuation, networking, communication protocols, and data handling.</li> </ul>				
UNIT-I	<b>Introduction to VR:</b> Goals and VR Definitions - Birds-eye view - Birds-eye view Software - Bird's-eyeview Hardware - Birds-eye view Sensation and Perception - Geometric modeling - Transformation- Matrices and rotation - Pitch Yaw and Roll				
UNIT-II	<b>Axis-Angle Representations:</b> Quaternions - Converting and Multiplying Rotations - Homogeneous Transformations - Viewing Transforms - Eye Transforms - Canonical View Transform- Viewport Transformation				
UNIT-III	<b>Three interpretations of light:</b> Refraction - Lens aberrations - Light intensity - Eye movement - Depth perception - Motion perception - Orientation tracking - Tilt Drift Correction - Yaw Drift Correction - Tracking with Camera - Perspective n-point Problem - Filtering				
UNIT-IV	<b>Introduction to AR:</b> Classification based on Sensor, Vision and Hybrid Tracking - Image Acquisition- Feature extraction - Feature Matching - Geometric Verification - Associated Information Retrieval - Feature Extraction Techniques - SIFT - SURF				
UNIT-V	<b>Introduction to IoT:</b> Sensing - Actuation - Networking - Communication Protocols - Sensor Networks - Machine-to-Machine Communication - BCI - Neuro Gaming - Data Handling and Analytics - Sensor Cloud - Smart Grid				
<b>Reference and Text Books:</b>					
<ul style="list-style-type: none"> <li>K. S. Hale and K. M. Stanney, "Handbook on Virtual Environments", 2nd edition, CRC Press, 2015.</li> <li>Mayer R, Mayer RE, "The Cambridge handbook of multimedia learning", Cambridge university press; 2005.</li> <li>Sadowski W, Stanney K, "Presence in virtual environments", 2002.</li> <li>Weinersmith, K. and Weiner, Z. "Soonish: Ten Emerging Technologies That'll Improve And/or Ruin Everything", 2017.</li> <li>Weiss J, Nolan J, Hunsinger J, Trifonas P, "The international handbook of virtual learning environments", Dordrecht, Netherlands Springer, 2006.</li> </ul>					
<b>Online Resources</b>					
<ul style="list-style-type: none"> <li><u>EMERGING TRENDS</u> <u>Virtual Reality</u> <u>Virtual reality</u></li> </ul>					
<b>Course Outcomes</b>				<b>Knowledge level</b>	
CO-1	Able to differentiate VR components, describe sensation and perception in VR, and apply geometric transformations and matrices for creating immersive experiences.			K2	
CO-2	To use axis-angle and quaternion representations for rotations, perform transformations, and apply viewing transforms for VR scenes.			K3	
CO-3	Able understand light interactions, depth perception mechanisms, motion perception cues, and implement orientation tracking while considering correction methods for VR experiences.			K2	
CO-4	To classify AR tracking methods, extract features from images, match and verify features, and retrieve associated information in augmented reality contexts.			K5	
CO-5	Explore IoT components, design sensing systems, analyze protocols, handle IoT data, and grasp IoT's impact on networks and data.			K6	

**Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	L(1)	S(3)	M(2)	S(3)
CO4	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2.4</b>	<b>3</b>	<b>2</b>	<b>1.8</b>	<b>2.8</b>	<b>2</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

**Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	S(3)	S(3)	S(3)	L(1)	L(1)
CO2	S(3)	S(3)	S(3)	L(1)	M(2)
CO3	S(3)	S(3)	S(3)	L(1)	M(2)
CO4	S(3)	S(3)	S(3)	L(1)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	S(3)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1.2</b>	<b>2.2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

### III -Semester

Core	Course code- 83734	Mini Project	PR	Credits:4	Hours:4
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. Develop the ability to formulate a well-defined research problem and articulate clear research questions or objectives.</li> <li>2. Demonstrate proficiency in conducting a comprehensive literature review to situate the dissertation within the broader academic context.</li> <li>3. Acquire advanced research and analytical skills to design and implement a robust methodology for data collection and analysis.</li> <li>4. Cultivate effective academic writing skills, including the synthesis and communication of complex ideas and findings in a coherent manner.</li> <li>5. Demonstrate a critical understanding of ethical considerations in research and apply ethical principles throughout the dissertation process.</li> </ol>				
<ol style="list-style-type: none"> <li>1. <b>Introduction and Background:</b> Clearly define the scope and purpose of the dissertation. - Provide a brief overview of the background literature and the research gap being addressed</li> <li>2. <b>Research Objectives:</b> Clearly state the research questions or objectives that the dissertation aims to address. - Align the objectives with the broader goals of the M.Sc. Multimedia program.</li> <li>3. <b>Literature Review:</b> Conduct a thorough review of relevant literature in the field of multimedia, highlighting key theories, frameworks, and previous research studies. - Identify gaps in the existing literature that the dissertation seeks to fill.</li> <li>4. <b>Methodology:</b> Detail the research design, methods, and tools employed in the study. - Justify the chosen methodology and discuss its appropriateness for the research questions.</li> <li>5. <b>Data Collection:</b> Describe the process of data collection, including the types of data gathered and the rationale for selecting - specific sources or participants</li> <li>6. <b>Analysis and Findings:</b> Present and analyze the data collected, demonstrating how it addresses the research questions. - Discuss any unexpected findings and their implications for the overall study.</li> <li>7. <b>Discussion:</b> Interpret the results in the context of the existing literature. - Discuss the significance of the findings and their contributions to the field of multimedia.</li> <li>8. <b>Conclusion:</b> Summarize the key findings and their implications. - Provide recommendations for future research or practical applications based on the results.</li> <li>9. <b>Limitations:</b> Acknowledge any limitations in the research design or data collection process. - Discuss how these limitations may have influenced the study's outcomes.</li> <li>10. <b>References:</b> Compile a comprehensive list of all sources cited in the dissertation, adhering to the required citation style (e.g., APA, MLA).</li> </ol>					

**Outcome**

1. Demonstrate the ability to formulate and articulate a well-defined research problem within the scope of multimedia studies for the dissertation project.
2. Apply advanced research methodologies and analytical techniques to investigate and address research questions in the field of multimedia.
3. Develop proficiency in critically reviewing and synthesizing existing literature to establish a strong theoretical foundation for the dissertation.
4. Showcase effective written communication skills through the production of a comprehensive and scholarly dissertation document that adheres to academic standards.
5. Demonstrate ethical research practices and a critical awareness of ethical considerations, ensuring the integrity and validity of the dissertation work in the context of multimedia studies.

**Course Outcome VS Programme Outcomes**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	S(3)
CO4	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.8</b>	<b>2</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.8</b>	<b>2.8</b>

S–Strong (3), M-Medium (2), L-Low (1)

**Mapping Course Outcome VS Programme Specific Outcomes**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

S–Strong (3), M-Medium (2), L-Low (1)

III – Semester- Core					
Core	Course Code-83735	Specialized Game Engine - II - Practicals	P	Credits: 4	Hours: 8
Objective	<ul style="list-style-type: none"> <li>● Create intricate environments demonstrating advanced level design principles.</li> <li>● Experiment with lighting configurations to evoke varying emotional responses in the game environment.</li> <li>● Build comprehensive character blueprints that include movement, interactions, animations, and sound integration.</li> <li>● Design interactive objects, employing Blueprints for seamless character interaction and providing visual and audio feedback.</li> <li>● Construct functional HUD/UI elements, such as health and ammo indicators, utilizing for player convenience.</li> </ul>				
<p><b>Exercise:</b></p> <ul style="list-style-type: none"> <li>● <b>Level Design and Lighting in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Create a small environment with detailed level design.</li> <li>○ Experiment with different lighting setups to evoke different moods.</li> </ul> </li> <li>● <b>Character Blueprint in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Develop a character blueprint with basic movement and interactions.</li> <li>○ Implement animations and sounds for character actions.</li> </ul> </li> <li>● <b>Interactive Objects in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Design objects that the character can pick up or interact with.</li> <li>○ Use Blueprints to handle object interaction and feedback.</li> </ul> </li> <li>● <b>User Interface (UI) Design in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Design and implement a HUD/UI with health, ammo, and other essential indicators.</li> <li>○ Use UMG to create functional UI elements.</li> </ul> </li> <li>● <b>AI Enemy Behavior in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Create AI enemies with simple behaviors like patrolling or following.</li> <li>○ Integrate AI perception to detect the player and react accordingly.</li> </ul> </li> <li>● <b>Physics and Destruction in Unreal Engine:</b> Set up physics-based interactions, like breakable objects or moving platforms.</li> <li>● <b>Multiplayer Gameplay in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Establish a multiplayer session with synchronized character movement.</li> <li>○ Explore replication techniques for networked gameplay.</li> </ul> </li> <li>● <b>Particle Effects in Unreal Engine:</b> Add dynamic particle effects for events like explosions or environmental effects.</li> <li>● <b>Blueprint Scripting Challenges in Unreal Engine:</b> Choose a specific gameplay mechanic (e.g., grappling hook, stealth) and implement it using Blueprints.</li> <li>● <b>Optimization and Packaging in Unreal Engine:</b> <ul style="list-style-type: none"> <li>○ Optimize a scene for better performance using techniques like culling and LODs.</li> <li>○ Package your project for a specific platform and ensure it runs smoothly.</li> </ul> </li> </ul>					

<b>Outcome</b>	<ul style="list-style-type: none"> <li>● <b>Generate a well-detailed environment exhibiting a profound understanding of level design techniques.</b></li> <li>● <b>Display expertise in employing diverse lighting setups to manipulate ambiance and emotion within the game world.</b></li> <li>● <b>Develop character blueprints, incorporating movement, interaction, animation, and sound elements for immersive gameplay.</b></li> <li>● <b>Create interactive objects within the game, utilizing Blueprints for smooth interaction mechanics and delivering player feedback.</b></li> <li>● <b>Implement a functional HUD/UI with essential indicators, skillfully utilizing UMG to enhance the player's experience.</b></li> </ul>	K6
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### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	M(2)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>2.6</b>	<b>3</b>	<b>2.4</b>	<b>3</b>	<b>3</b>	<b>2.4</b>	<b>3</b>	<b>3</b>	<b>3</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	S(3)	M(2)
CO2	S(3)	S(3)	M(2)	S(3)	M(2)
CO3	S(3)	S(3)	M(2)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2.6</b>

S–Strong (3), M-Medium (2), L-Low (1)

III– Semester- Elective - III						
DSE - 3	Course Code - 83736A	1. ADVANCED GAME PROGRAMMING		T	Credits: 3	Hours: 3
				Objectives	<ul style="list-style-type: none"> <li>To understand the history, types, selection, and application of design patterns, and revisit core OOP concepts.</li> <li>To learn various creational, structural, and behavioral design patterns, and comprehend their uses and implementations.</li> <li>Apply design patterns to game development, specifically focusing on builder, factory method, prototype, singleton, and various other patterns.</li> <li>To educate sequencing and decoupling patterns, including double buffer, game loop, component-based design, and various optimization techniques.</li> <li>Apply design patterns to specific game components like brick systems, power-ups, paddle mechanics, enemy behaviors, and collision control.</li> </ul>	
UNIT-I	<b>Introduction to Design Patterns:</b> Design Pattern History - Types of Design Patterns - Problem Solving using Design Patterns - Selecting Design Pattern - Using Design Pattern - Revisiting OOPS-Abstraction - Inheritance - Polymorphism - Encapsulation					
UNIT-II	<b>Creational Design Patterns:</b> Abstract Factory - Builder - Factory Method - Object Pool - Prototype-Singleton - Structural Design Pattern: Adapter - Bridge - Composite - Decorator - Facade - Flyweight- Private Class Data - Proxy Behavioral Design Pattern: Chain of Responsibility - Command- Interpreter - Iterator - Mediator - Memento - Null Object - Observer - State - Strategy - Template method - Visitor					
UNIT-III	<b>Design Patterns in Games with Examples:</b> Builder - Factory Method - Prototype – Singleton-Adapter - Composite - Facade - Flyweight - Proxy Chain of Responsibility - Command - Mediator- Observer - State - Strategy - Template Method					
UNIT-IV	<b>Sequencing Patterns:</b> Double Buffer - Game Loop - Update Method - Behavioural Patterns-Bytecode - Subclass Sandbox - Type Object - Decoupling Patterns - Component – Event Queue - Service Locator - Optimization Process - Data Locality - Dirty Flag - Object Pool - Spatial Partition- Entity Component System					
UNIT-V	<b>Design Patterns in Breakout:</b> Bricks System - Power Up Management - Simple Paddle - Paddlewith Special Power - Managing Game Mechanics - Collision Control – Space Invaders: - EnemySystem - Upgrade system - Weapon system - Power Up Management - Enemy Movement Pattern- Identifying the Common Factors in Breakout and Space Invaders					
<b>Reference and Text Books:</b> <ul style="list-style-type: none"> <li>“Game Programming Patterns”, Robert Nystrom, Genever Benning, 2014</li> </ul> <b>References:</b> <ul style="list-style-type: none"> <li>Ahnert, K., &amp; Mulansky, M “Odeint–solving ordinary differential equations in C++”, InAIPConference Proceedings, AIP, 2011.</li> <li>Andrei Alexandrescu, “Modern C++ Design: Generic Programming and DesignPatternsApplied” illustrated, reprint, Addison-Wesley Professional, 2011.</li> <li>Bangerth, W, “Using Modern Features of C++ for Adaptive Finite Element Methods”, Dimension Independent Programming in dealwII, 2000.</li> <li>Gamma, E, “Design patterns: elements of reusable object-oriented software”, PearsonEducation India, 1995</li> <li>M. S. Joshi, “C++ Design Patterns and Derivatives Pricing”, Cambridge University Press, 2011.</li> </ul> <b>Online Resources</b> <ul style="list-style-type: none"> <li><a href="https://gameprogrammingpatterns.com/">https://gameprogrammingpatterns.com/</a></li> </ul>						
<b>Course Outcomes</b>					<b>Knowledge level</b>	
CO-1	Able to identify appropriate design patterns for problem-solving, apply them effectively, and demonstrate a strong grasp of OOP principles including abstraction, inheritance, polymorphism, and encapsulation.				K3	
CO-2	Employ creational and structural design patterns such as abstract factory, builder, adapter, composite, decorator, and more, enabling them to create well-structured and modular software designs.				K4	
CO-3	Integrate design patterns into game development, using examples of builder, factory method, prototype, and singleton patterns to enhance the architecture of games.				K3	

<b>CO-4</b>	<b>Implement sequencing patterns like game loops, apply decoupling techniques to improve code flexibility, and use optimization methods to enhance game performance.</b>	<b>K5</b>
<b>CO-5</b>	<b>Implement design patterns within game development, specifically focusing on applying patterns to various components and mechanics in breakout-style and space invaders-style games.</b>	<b>K5</b>

#### Course Outcome VS Programme Outcomes

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	S(3)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
<b>W.AV</b>	<b>3</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2.6</b>	<b>2.4</b>	<b>2.8</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

#### Mapping Course Outcome VS Programme Specific Outcomes

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	L(1)	M(2)	M(2)	M(2)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>2.2</b>	<b>2</b>	<b>2</b>	<b>2.2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

III– Semester- Elective - III					
DSE - 3	Course Code- 83736B	2. ADVANCED GAME ART	T	Credits:	Hours:
				3	3
<b>Objectives</b>	<ul style="list-style-type: none"> <li>To provide a framework for artists to develop their skills and express themselves through their chosen medium, whether it's painting, drawing, sculpture, photography, digital art, or any other form of visual expression.</li> <li>The main objective of perspective drawing is to accurately represent how objects appear in space relative to the viewer's point of view.</li> <li>To educate students to understand the structure and function of the human body.</li> <li>It involves understanding how colors interact, how they can convey meaning, and how to use them effectively in visual compositions</li> <li>To acquaint students with the creation of art installations and site-specific artworks that interact with and respond to the physical environment.</li> <li>Allows artists to connect deeply with the physical world and engage viewers in thought-provoking ways.</li> </ul>				
<b>UNIT-I</b>	<b>Animation Fundamentals:</b> Understanding animation principles such as timing, spacing, weight, and anticipation. Observing how objects move in the real world to create convincing animation physics and dynamics.				
<b>UNIT-II</b>	<b>Anatomy:</b> Understanding of human and animal anatomy. This knowledge is essential for character design and creating realistic movements in animation.				
<b>UNIT-III</b>	<b>Gesture and Acting:</b> Practicing on capturing gestures and expressions that convey personality and emotion in your characters..				
<b>UNIT-IV</b>	<b>Character Design:</b> Practicing character design, creating unique and appealing characters that fit various animation styles and narratives.				
<b>UNIT-V</b>	<b>Learn Storytelling:</b> Understand storytelling techniques, storyboarding, and how to convey emotion and narrative through visual elements.				
<b>Reference and Text Books:</b>					
<ul style="list-style-type: none"> <li>Woods, S. (2002). THE ANIMATOR'S SURVIVAL KIT. Film Ireland, (85), 28.</li> <li>Blair, P. (2020). Cartoon Animation with Preston Blair, Revised Edition!: Learn techniques for drawing and animating cartoon characters. Walter Foster Publishing.</li> <li>Hoberman, J. (1982). Disney Animation: The Illusion of Life. Film Comment, 18(1), 67.</li> <li>Goldberg, E. (2008). Character Animation Crash Course! (p. 218). Los Angeles, CA: Silman-James Press.</li> <li>Hooks, E. (2017). Acting for animators. Taylor &amp; Francis.</li> </ul>					
<b>Online Resources</b>					
<a href="https://www.animationmentor.com/resources/">https://www.animationmentor.com/resources/</a>					
<a href="https://www.youtube.com/watch?v=dpwgmOGJQIw">https://www.youtube.com/watch?v=dpwgmOGJQIw</a>					
<a href="https://animatorsresourcekit.blog/">https://animatorsresourcekit.blog/</a>					
<a href="https://animationresources.org/">https://animationresources.org/</a>					
<b>Course Outcomes</b>					<b>Knowledge level</b>
<b>CO-1</b>	Develop animation expertise, explore history, master media platforms, and enhance communication.				<b>K1</b>
<b>CO-2</b>	Acquire animation tech knowledge, master diverse techniques, explore cutting-edge methods, and excel in digital data processing.				<b>K3&amp;K6</b>
<b>CO-3</b>	Harness animation for storytelling, compare mediums, craft innovative narratives, generate short film concepts, refine interest curves, and creatively employ clichés.				<b>K4</b>
<b>CO-4</b>	Master character definition, act for animation, decipher attributes, express through body language, convey actions, create anthropomorphic characters, and navigate the uncanny valley.				<b>K5</b>
<b>CO-5</b>	Grasp animation principles through film analysis, apply fundamentals: stretch, anticipation, staging, follow-through, timing, and more.				<b>K2&amp;K6</b>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	S(3)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>	<b>3</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

III– Semester- Elective - III					
DSE - 3	Course Code- 83736C	3. ARTIFICIAL INTELLIGENCE FOR GAMES	T	Credits:	Hours:
				3	3
Objectives	<ul style="list-style-type: none"> <li>● To learn the fundamental concepts of problem-solving in artificial intelligence, including problem spaces, search techniques, and production system characteristics.</li> <li>● To educate the intricacies of implementing diverse AI strategies in game development, encompassing roaming, patterned behavior, chasing, evading, backtracking, and strategic decision-making.</li> <li>● To acquire a solid grasp of various advanced AI methods used in games, spanning pathfinding, rule-based systems, fuzzy logic, genetic algorithms, and neural networks.</li> <li>● Gain proficiency in diverse knowledge representation methods, including production and frame-based systems, fuzzy reasoning, Bayesian networks, and advanced plan generation techniques.</li> <li>● Comprehend expert systems' architecture, knowledge acquisition, meta knowledge, and the integration of AI techniques for intelligent agents in games.</li> </ul>				
UNIT-I	<b>Introduction to Artificial Intelligence:</b> The AI Problems - AI Technique - The Level of the Model - Criteria for success - Problems, Problem Spaces and Search : Defining the problem as a StateSpaceSearch - Production System Characteristics - Issues in the Design of Search Programs.				
UNIT-II	<b>Game Artificial Intelligence:</b> Types of AI - Roaming AI - Patterned Roaming , Chasing Evading- Backtracking - Creating Grid Based Canvas - Behavioral AI - State change - Strategically AI - HowtoCreate Strategically AI in Games - The importance of good Game AI. The differences between Game AI and AI and their relative advantages and disadvantages				
UNIT-III	<b>Deterministic and Non deterministic:</b> consideration for Game AI & AI systems Pathfinding - A* and its derivatives - Flocking and Steering AI - Rule Based Systems - Finite State Machines - Patterning and Way point - Chasing and Evading - Fuzzy Logic and Fuzzy State Machines - Genetic Algorithms- Artificial Neural Networks - Rule based AI				
UNIT-IV	<b>Knowledge representation:</b> Production based system - Frame based system - Inference – Backward chaining - Forward chaining - Rule value approach - Fuzzy reasoning – Certainty factors - Bayesian Theory - Bayesian Network-Dempster – Shafer theory - Basic plan generation systems – Strips- Advanced plan generation systems – K strips				
UNIT-V	<b>Expert systems:</b> Architecture of expert systems - Roles of expert systems – Knowledge Acquisition – Meta knowledge - Heuristics. - Applied AI : Combining AI techniques to produce Intelligent Agents - Strategic AI : The Future for AI in games				
<b>Reference and Text Books:</b>					
<ul style="list-style-type: none"> <li>● Copeland J, “Artificial intelligence: A philosophical introduction”, John Wiley &amp; Sons, 2015.</li> <li>● David L. Poole, Alan K. Mackworth, “Artificial Intelligence: Foundations of Computational Agents”, Cambridge University Press, 2010.</li> <li>● Elaine Rich, Kevin Knight, Shivashankar B Nair, “Artificial Intelligence”, Tata McGraw-Hill publishing, 2009.</li> <li>● Rich, “Artificial Intelligence 3E (Sie)”, Tata McGraw-Hill Education, 2004.</li> <li>● Russell SJ, Norvig P, “Artificial intelligence: a modern approach”, Pearson EducationLimited, 2016.</li> </ul>					
<b>Online Resources</b>					
<ul style="list-style-type: none"> <li>● <a href="#">Artificial Intelligence</a></li> </ul>					

Course Outcomes		Knowledge level
CO-1	Deconstruct problems into state space models, employ diverse search methods, and construct rudimentary production systems, demonstrating an awareness of search program design challenges.	K3
CO-2	To apply AI techniques in games, create behavioral patterns, and recognize the significance of effective Game AI, while understanding differences and trade-offs between Game AI and general AI.	K4
CO-3	To implement a range of advanced AI strategies, enhancing games through efficient pathfinding, complex behaviors, adaptive decision-making, evolutionary optimization, and learning-based actions.	K5
CO-4	To apply these techniques to represent knowledge, utilize reasoning mechanisms, and design effective plans in AI systems.	K5
CO-5	To create expert systems, gather knowledge, use meta knowledge, combine AI techniques for intelligent agents, and recognize the significance of strategic AI for the gaming future.	K6

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	M(2)	M(2)	M(2)	L(1)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
W.AV	2.6	2.6	2.4	1.8	2	2	2	2.6	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	L(1)	M(2)	M(2)	M(2)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	2.2	2	2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

III – Semester					
NME - 2	Course Code-83737A	1. VIDEO AND AUDIO EDITING	P	Credits:	Hours:
				2	3
<b>Objectives</b>	The objective of audio and video editing is to enhance and refine the quality of audio and video content. This involves tasks such as removing unwanted elements, improving clarity, adjusting visual and auditory elements, and creating a seamless, polished final product. The goal is to create professional, engaging, and aesthetically pleasing audio and video presentations for various purposes, including entertainment, education, and communication.				
	<ol style="list-style-type: none"> <li>1. Edit the video footage to create a compelling and dynamic game trailer. Add transitions, effects, and overlays to enhance visual appeal.</li> <li>2. Select or create background music that complements the game's theme and intensity. Integrate sound effects for key actions or events in the gameplay.</li> <li>3. If suitable, record a narration or voiceover to provide context or highlight features. Ensure the voice aligns with the tone and style of the game.</li> <li>4. Export the final edited video in a suitable format. Present the interactive game trailer to showcase the gameplay experience.</li> <li>5. Incorporate interactive elements within the video, such as clickable annotations or hotspots. These elements should trigger additional video clips or reveal more information when interacted with.</li> </ol>				
<b>Outcomes</b>	The outcome of audio and video editing is a polished and refined content piece with improved visual and auditory quality. Unwanted elements are removed, and adjustments are made to create a professional and engaging final product suitable for diverse purposes such as entertainment, education, or communication.				

#### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1.4</b>	<b>2</b>	<b>2.4</b>	<b>2</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	M(2)	M(2)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	M(2)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2.6</b>	<b>2.2</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

III – Semester					
NME - 2	Course Code- 83737B	2. LIGHTING AND RENDERING	P	Credits:	Hours:
				2	3
Objectives	<ul style="list-style-type: none"> <li>➤ 1. Develop practical skills in applying various lighting techniques to 3D scenes, including ambient lighting, directional lighting, and point lights.</li> <li>➤ 2. Gain hands-on experience in applying realistic materials and shaders to 3D models, exploring different surface properties and interactions with light.</li> <li>➤ 3. Understand and implement advanced rendering settings, including ray tracing, global illumination, and optimization techniques for efficient and high-quality renders.</li> <li>➤ 4. Learn practical approaches to scene composition and cinematography, including camera placement, framing, and storytelling through lighting and rendering choices.</li> <li>➤ Explore post-processing techniques for enhancing rendered images, including color correction, depth of field, and other image adjustments to achieve desired visual effects.</li> </ul>				
<ol style="list-style-type: none"> <li>1. <b>Introduction to Lighting Principles:</b> Overview of fundamental lighting principles, including types of light sources, shadows, and their impact on the visual appearance of 3D scenes.</li> <li>2. <b>Practical Application of Ambient Lighting:</b> Hands-on exercises focusing on the practical application of ambient lighting to create a base level of illumination within 3D scenes.</li> <li>3. <b>Directional and Point Lights in Practice:</b> Practical demonstrations and exercises involving the application of directional and point lights to achieve specific lighting effects and moods.</li> <li>4. <b>Realistic Material and Shader Application:</b> In-depth exploration of applying realistic materials and shaders to 3D models, emphasizing surface properties and interactions with light sources.</li> <li>5. <b>Advanced Rendering Settings:</b> Practical sessions covering advanced rendering settings, including ray tracing, global illumination, and other settings for achieving high-quality renders.</li> <li>6. <b>Optimization Techniques for Efficient Rendering:</b> Techniques and strategies for optimizing rendering processes to achieve efficiency without compromising the quality of the final render.</li> <li>7. <b>Scene Composition and Cinematography:</b> Practical exercises on scene composition, camera placement, and cinematography principles to enhance storytelling and visual impact in 3D scenes.</li> <li>8. <b>Atmospheric and Environmental Lighting:</b> Exploration of techniques for implementing atmospheric and environmental lighting to create immersive and visually compelling 3D environments.</li> <li>9. <b>Post-Processing for Image Enhancement:</b> Hands-on sessions covering post-processing techniques such as color correction, depth of field, and other enhancements to refine rendered images.</li> <li>10. <b>Practical Project:</b> Application of acquired skills in a practical project, allowing students to showcase their understanding of lighting and rendering principles in a comprehensive 3D scene.</li> </ol>					
Outcomes	<ul style="list-style-type: none"> <li>➤ 1. Graduates demonstrate proficiency in practical lighting techniques, showcasing the ability to effectively use different light</li> <li>➤ 2. Successful participants exhibit mastery in applying realistic materials and shaders to 3D models, creating surfaces that interact authentically with lighting conditions.</li> <li>➤ 3. Ensuring efficient and high-quality renders while understanding the impact of advanced rendering settings.</li> <li>➤ 4. Individuals demonstrate mastery in scene composition and cinematography, employing practical skills to create visually compelling and well-balanced 3D scenes.</li> <li>➤ Successful completion of the module equips participants with the skills to enhance rendered images through post-processing techniques, achieving desired visual effects and refinements.</li> </ul>				

**Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
O5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.A V</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

**Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

III – Semester					
NME - 2	Course Code-83737C	3. MATTE PAINTING	P	Credits:	Hours:
				2	3
Objectives	<ul style="list-style-type: none"> <li>➤ 1. Achieve the illusion of authentic, believable landscapes or settings through the integration of painted elements.</li> <li>➤ 2. Contribute to the mood and tone of a scene by adding visual elements that complement the storytelling and cinematic experience.</li> <li>➤ 3. Expand the scope of a film or project by painting extensions to physical sets, providing a broader and more immersive visual experience.</li> <li>➤ 4. Save time and resources by digitally painting intricate details instead of constructing elaborate physical sets or traveling to various locations.</li> <li>➤ Ensure a seamless blend between live-action footage and painted elements to maintain a cohesive and natural-looking visual narrative.</li> </ul>				
<b>Exercise:</b> <ol style="list-style-type: none"> <li>1. Utilizing your preferred digital painting software, outline the step-by-step process you would follow to create a basic matte painting from scratch. Include details on layer management, brush techniques, and any additional tools you find useful.</li> <li>2. Demonstrate how you would effectively use layers to build up a matte painting. Discuss the importance of organizing layers, adjustment layers, and masking techniques in creating a seamless composition.</li> <li>3. Choose a specific surface within your matte painting (e.g., a brick wall, water, or foliage) and explain how you would apply realistic textures to enhance the visual appeal. Discuss the use of texture overlays, blending modes, and brush settings.</li> <li>4. Explore the process of integrating photographic elements into your matte painting. Describe the criteria you use for selecting appropriate images, and explain how you ensure cohesive integration with the painted elements.</li> </ol>					
Outcomes	<ul style="list-style-type: none"> <li>● Graduates showcase mastery in digital brushwork, blending, and scene creation for diverse visual narratives.</li> <li>● Students produce compelling matte paintings, seamlessly integrating with live-action footage for enhanced storytelling in film and media.</li> <li>● Successful participants demonstrate the ability to craft imaginative and realistic landscapes, from futuristic cityscapes to ancient realms.</li> <li>● Graduates exhibit expertise in matte painting techniques, transporting audiences seamlessly through historical eras with precision and artistry</li> <li>● Completion of the module equips individuals with the skills to contribute to film, gaming, and visual effects productions, showcasing professional-grade matte painting portfolios.</li> </ul>				

**Course Outcome VS Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1.4</b>	<b>2</b>	<b>2.4</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

**Mapping Course Outcome VS Programme Specific Outcomes**

<b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	M(2)	M(2)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	M(2)
<b>W.AV</b>	<b>3</b>	<b>3</b>	<b>2.6</b>	<b>2.2</b>	<b>2</b>

**S–Strong (3), M-Medium (2), L-Low (1)**

IV-Semester- Core					
Core	Course Code- 83741A/ 83741B	83741A DISSERTATION/ 83741B INTERNSHIP	D/I	Credits: 15	Hours: 30
Objectives	<ul style="list-style-type: none"> <li>➤ Develop a comprehensive and functional game prototype that demonstrates mastery of chosen programming languages and tools.</li> <li>➤ Apply theoretical knowledge to address practical challenges within game development, showcasing problem-solving abilities.</li> <li>➤ Demonstrate creativity and innovation in designing gameplay mechanics or features that exhibit a deep understanding of gaming concepts.</li> <li>➤ Create a cohesive documentation outlining the development process, decision-making rationale, and technical aspects of the project.</li> <li>➤ Present and defend the project's technical aspects and design choices through a well-structured dissertation or presentation.</li> </ul>				
Outcomes	<ul style="list-style-type: none"> <li>➤ Students will demonstrate a high level of proficiency in game development, showcasing skills in programming, game design, and implementation.</li> <li>➤ Acquiring the ability to analyze complex problems within game development and devise effective solutions, displaying critical thinking and problem-solving capabilities.</li> <li>➤ Demonstrating creativity in applying theoretical knowledge to create innovative gameplay mechanics, features, or visual elements.</li> <li>➤ Producing comprehensive documentation that details the project's development process, methodologies used, challenges faced, and solutions implemented.</li> <li>➤ Improved abilities to communicate technical concepts effectively, both in writing (documentation) and orally (presentations), fostering clearer articulation of ideas and technical decisions.</li> <li>➤ Developing skills in project management, including time management, task prioritization, and resource allocation to successfully complete a substantial project within a specified timeline.</li> <li>➤ Gaining familiarity with industry standards and best practices in game development, preparing students for potential careers in the field.</li> <li>➤ Instilling confidence in their abilities to independently conceptualize, plan, execute, and present a significant project within the realm of game programming.</li> </ul>				
<b>AIM OF THE PROJECT WORK</b>					
<ol style="list-style-type: none"> <li>1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.</li> <li>2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts.</li> <li>3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.</li> </ol>					
<b>VivaVoce</b>					

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a total of 100 marks at the last day of the practical session.
2. Out of 100 marks, 25 marks for CIA and 75 for CEE (50 evaluation of project report + 25 Viva Voce).

### **Project Report Format**

PROJECT WORK

#### **TITLE OF THE DISSERTATION**

Bonafide Work Done by

STUDENT NAME

REG. NO.

GUIDE NAME

Dissertation submitted in partial fulfillment of the requirements for the award of

<Name of the Degree>

ICAT Design and Media College, Chennai.

College Logo

Signature of the Guide

Signature of the HOD

Submitted for the Viva-Voce Examination held on \_\_\_\_\_

Internal Examiner

External Examiner

Month – Year

University Logo

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### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.2</b>	<b>2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>	<b>2</b>

S–Strong (3), M-Medium (2), L-Low (1)

### Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
<b>W.AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2.2</b>	<b>2.4</b>

S–Strong (3), M-Medium (2), L-Low (1)

## PG Programme

### 19.1 Passing minimum

- A candidate shall be declared to have passed each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 50% in the aggregate, taking Continuous Assessment and End Semester Examinations marks together.
- The candidates not obtain 40% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests and by submitting assignments.
- Candidates, who have secured the pass marks in the End-Semester Examination and in the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.
- A candidate shall be declared to have passed the Project/Dissertation/Internship if he/she gets not less than 40% in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 50% in the aggregate in each of the Project/Dissertation/Internship Report and Viva-Voce.
- A candidate who gets less than 50% in the Project/Dissertation/Internship Report must resubmit the thesis. Such candidates need to take again the Viva-Voce on the resubmitted Project report.

### 19.2 Grading

The following table gives the marks, Grade points, Letter Grades, and classifications meant to indicate the overall academic performance of the candidate.

Conversion of Marks to Grade Points and Letter Grade (Performance in Paper/ Course)

<b>RANGE OF MARKS</b>	<b>GRADE POINTS</b>	<b>LETTER GRADE</b>	<b>DESCRIPTION</b>
90 - 100	<b>9.0 – 10.0</b>	<b>O</b>	<b>Outstanding</b>
80 - 89	<b>8.0 – 8.9</b>	<b>D+</b>	<b>Excellent</b>
75 - 79	<b>7.5 – 7.9</b>	<b>D</b>	<b>Distinction</b>
70 - 74	<b>7.0 – 7.4</b>	<b>A+</b>	<b>Very Good</b>
60 - 69	<b>6.0 – 6.9</b>	<b>A</b>	<b>Good</b>
50 - 59	<b>5.0 – 5.9</b>	<b>B</b>	<b>Average</b>
00 - 49	<b>0.0</b>	<b>U</b>	<b>Re-appear</b>
ABSENT	<b>0.0</b>	<b>AAA</b>	<b>ABSENT</b>

- a) Successful candidates passing the examinations and earning a GPA between 9.0 and 10.0 and marks from 90 – 100 shall be declared to have Outstanding (O).
- b) Successful candidates passing the examinations and earning a GPA between 8.0 and 8.9 and marks from 80 - 89 shall be declared to have Excellent (D+).
- c) Successful candidates passing the examinations and earning a GPA between 7.5 – 7.9 and marks from 75 - 79 shall be declared to have Distinction (D).
- d) Successful candidates passing the examinations and earning a GPA between 7.0 – 7.4 and marks from 70 - 74 shall be declared to have Very Good (A+).
- e) Successful candidates passing the examinations and earning a GPA between 6.0 – 6.9 and marks from 60 - 69 shall be declared to have Good (A).
- f) Successful candidates passing the examinations and earning a GPA between 5.0 – 5.9 and marks from 50 - 59 shall be declared to have an Average (B).
- g) Candidates earning a GPA between 0.0 and marks from 00 - 49 shall be declared to have Re-appear (U).
- h) Absence from an examination shall not be taken as an attempt.

From the second semester onwards the total performance in a semester and continuous performance starting from the first semester are indicated respectively as Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA). These two are calculated by the following formulae

$$\text{GRADE POINT AVERAGE (GPA)} = \frac{\sum C_i G_i}{\sum C_i}$$

$$\text{GPA} = \frac{\text{Sum of the multiplication of Grade Points by the credits of the courses}}{\text{Sum of the credits of the courses in a Semester}}$$

### 19.3 Classification of the final result

CGPA	Grade	Classification of Final Result
9.5 – 10.0 9.0 and above but below 9.5	<b>O+</b> <b>O</b>	First Class – Exemplary*
8.5 and above but below 9.0 8.0 and above but below 8.5 7.5 and above but below 8.0	<b>D++</b> <b>D+</b> <b>D</b>	First Class with Distinction*
7.0 and above but below 7.5 6.5 and above but below 7.0 6.0 and above but below 6.5	<b>A++</b> <b>A+</b> <b>A</b>	First Class
5.5 and above but below 6.0 5.0 and above but below 5.5	<b>B+</b> <b>B</b>	Second Class
0.0 and above but below 5.0	<b>U</b>	Re-appear

The final result of the candidate shall be based only on the CGPA earned by the candidate.

- a) Successful candidates passing the examinations and earning a CGPA between 9.5 and 10.0 shall be given Letter Grade (O+), and those who earned a CGPA between 9.0 and 9.4 shall be given Letter Grade (O) and declared to have First Class –Exemplary\*.
- b) Successful candidates passing the examinations and earning a CGPA between 7.5 and 7.9 shall be given Letter Grade (D), those who earned a CGPA between 8.0 and 8.4 shall be given Letter Grade (D+), those who earned a CGPA between 8.5 and 8.9 shall be given Letter Grade (D++) and declared to have First Class with Distinction\*.
- c) Successful candidates passing the examinations and earning a CGPA between 6.0 and 6.4 shall be given Letter Grade (A), those who earned a CGPA between 6.5 and 6.9 shall be given Letter Grade (A+), those who earned a CGPA between 7.0 and 7.4 shall be given Letter Grade (A++) and declared to have First Class.
- d) Successful candidates passing the examinations and earning a CGPA between 5.0 and 5.4 shall be given a Letter Grade (B), and those who earned a CGPA between 5.5 and 5.9 shall be given a Letter Grade (B+) and declared to have passed in Second Class.
- i) Candidates who earned a CGPA between 0.0 and 4.9 shall be given Letter Grade (U) and declared to have Re-appear.

e) Absence from an examination shall not be taken as an attempt.

CUMULATIVE GRADE POINT AVERAGE (CGPA) =  $\frac{\sum_n \sum_i C_{ni} \cdot G_{ni}}{\sum_n \sum_i C_{ni}}$

CGPA = Sum of the multiplication of Grade Points by the credits of the entire Programme

Sum of the credits of the courses for the entire Programme

Sum of Grade Points X credits of the entire Programme

Where 'Ci' is the Credit earned for Course i in any semester; 'Gi' is the Grade Point obtained by the student for Course i and 'n' refers to the semester in which such courses were credited.

**CGPA** (Cumulative Grade Point Average) = Average Grade Point of all the Courses passed starting from the first semester to the current semester.

Note: \* The candidates who have passed in the first appearance and within the prescribed Semesters of the PG Programme are alone eligible for this classification.