B.Tech. (GAME DESIGN TECHNOLOGIES)

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABUS

(EFFECT FROM ACADEMIC YEAR 2021 – 2022)

SCHOOL OF PLANNING & ARCHITECTURE

DR.YSR ARCHITECTURE AND FINE ARTS UNIVERSITY

KADAPA–516002

1. Preamble:

The Game Design Technologies is a specialized course that provides knowledge and training in designing and development of 3D games. Creating video games is an endeavor that lies at the merger of two main disciplines, computer programming and creating artwork. This course provides basic skills for conceptualizing, designing, implementing and testing the game. It majorly emphasizes on theoretical and practical approach to game design by utilizing standardized tools. Overall, the students will have a wider scope to develop their creative side and there is an emphasis on using their imagination to build and enrich the gaming experience. The course is intended to bridge the rich talent pool in engineering academia, with the vast gaming industry.

COURSE OUTCOMES

At the end of the course learners will be able to

- Recognize the design principles of gaming application.
- Implement the use of gaming tools in application design.
- Construct an architectural design using the development process.
- Examine the prototype for an existing application.
- Demonstrate audio and visual effects in a game.
- Get hands-on experience with game engines, e.g., Unity.
- Be familiar with usage of subcomponents of game engines such as graphics and audio engines.

2. Vision:

The Vision of Game Design Technologies is to be globally excellent in gaming technology. To focus on providing colossal career opportunities and to mould the students to earn while learning.

3. Mission:

The Mission of Game Design Technologies shall serve the student to provide right path to become employable through active participation and hands on work experiences.

Program Educational Objectives (PEOs):

PEO 1: To provide core theoretical and practical knowledge in the domain of game design for leading successful career in industries or for pursuing higher studies.

PEO 2: To prepare and assist the graduates to be successful in higher education leading to masters and research programs, to achieve professional competency in the field of engineering and technology.

PEO 3: Graduates will be capable to apply the knowledge of the latest technologies, utilities and simulation tools, to provide solutions to different domain by identifying, formulating and analysing their problems.

PEO 4: To infuse the ability to analyse the requirements, understand the technical specifications and design the innovative solutions by applying the principles of computing.

Program Outcomes (POs)

1. **Technical and management knowledge: An ability to apply knowledge of science, Engineering, technology and management to the solution of complex problems.**
2. **Problem analysis: An ability to identify, formulate, review and analyze and solve complex built environment problems**
3. **Design & development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**
4. **Analysis, Design and Research: An ability to design and conduct experiments, as well as to analyze and interpret data**
5. **Modern tool usage: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice**
6. **The society and culture: Contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Built environment sector.**
7. **Environment and sustainability: The broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context.**
8. **Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the professional practice.**
9. **Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**
10. **Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend**

and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Correlation between the POs and the PEOs

PEOs	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
I	✓	✓	✓	✓								
II			✓	✓	✓	✓	✓	✓				
III								✓	✓	✓	✓	
IV							✓					✓

Program Specific Outcomes (PSOs):

PSO 1: Design and develop solutions by following standard principles and implement by using suitable programming languages and platforms.

PSO 2: To instill positive attitude, excel in communication skills and ability to work as an individual or in a team.

PSO 3: To prepare students to use modern tools effectively to grab opportunities.

PSO 4: Cultivate the field of game design and its latest trends, to pursue teaching, research & development activities and to work effectively in a team.

COURSE STRUCTURE

SEMESTER I

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T / S	P	Total		Int	Ext	Total	W/P/J
1.	CC21B1G1	Mathematics-I	3	2	0	5	4	50	50	100	W
2.	GD21B1G2	English-I	3	0	2	5	5	50	50	100	W
Professional Core											
3.	GD21B1C1	History of Gaming	3	2	0	5	4	50	50	100	W
4.	GD21B1C2	C Programming	4	0	0	4	4	50	50	100	W
Laboratories / Studio / practical											
5.	GD21B1S1	Fundamentals of Art	3	2	0	5	5	50	50	100	J
6.	GD21B1P1	C Programming for problem solving Lab	0	0	4	4	4	50	50	100	P
7.	GD21B1P2	Computer Applications	3	0	2	5	4	50	50	100	P
Mandatory Course											
8.	MC21B101	UHV-I(AICTE)	1	0	0	1	0	-	-	-	Nil
		Total	**20**	**6**	**8**	**34**	**30**				

* Note: W- Written, P- Practical, J - Jury

(All Practical semester end exams will be followed by Viva- Voce)

SEMESTER II

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T/S	P	Total		Int	Ext	Total	W/P/J
1	CC21B2G1	Mathematics-II	3	2	0	5	4	50	50	100	W
2	GD21B2G2	Communication Skills	3	2	0	5	4	50	50	100	W
Professional Core											
3	GD21B2C1	Fundamentals of Game Design	4	0	0	4	4	50	50	100	W
4	GD21B2C2	Computer Organization	4	0	0	4	4	50	50	100	W
5	GD21B2C3	Data Structures	4	0	0	4	4	50	50	100	W
Laboratories / Studio / practical											
6	GD21B2S1	3D Art and Design Fundamentals	2	3	0	5	5	50	50	100	J
7	GD21B2P1	Data structures Lab	0	2	4	6	5	50	50	100	P
Mandatory Course											
8	MC21B201	Environmental Studies	1	0	0	1	0	-	-	-	Nil
		Total	**21**	**9**	**4**	**34**	**30**				

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

SEMESTER III

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1	GD21B3C1	UX & UI Design	3	2	0	5	4	50	50	100	W
2	GD21B3C2	Colour Theory	3	2	0	5	4	50	50	100	W
3	GD21B3C3	Python Programming	3	2	0	5	4	50	50	100	W
4	GD21B3C4	Cyber Laws	4	0	0	4	4	50	50	100	W
Laboratories/Studios/Practical											
5	GD21B3P1	Creative Writing and Designing Lab	1	0	4	5	5	50	50	100	P
6	GD21B3P2	Python Programming Lab	0	1	4	5	5	50	50	100	P
Ability Enhancement Course											
7	GD21B3K1	Critical & Creative Thinking	2	0	0	2	2	50	50	100	W
Open Elective											
8	GD21B3O1	Open Elective	2	0	0	2	2	100	-	100	-
Mandatory Course											
9	MC21B301	Indian Constitution	1	0	0	1		-	-	-	-
		Total	**19**	**7**	**8**	**34**	**30**				

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

SEMESTER IV

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1.	GD21B4C1	Animation, Materials and Shaders	3	2	0	5	4	50	50	100	W
2.	GD21B4C2	Digital Image Processing	3	0	0	3	3	50	50	100	W
3.	GD21B4C3	Game Engine Architecture	3	1	0	4	3	50	50	100	W
4.	GD21B4C4	Operating Systems	4	0	0	4	4	50	50	100	W
5.	GD21B4C5	Java Programming	3	0	0	3	3	50	50	100	W
6.	GD21B4C6	Game Analysis	3	1	0	4	3	50	50	100	W
Laboratories/Studios/Practical											
7.	GD21B4P1	Image Editing using Photoshop Lab	0	0	4	4	4	50	50	100	P
8.	GD21B4P2	Java Programming Lab	0	0	4	4	4	50	50	100	P
Open Elective											
9.	GD21B4O1	Open Elective	2	0	0	2	2	100	-	100	-
Mandatory Course											
10.	MC21B401	Essence of Indian Traditional Knowledge	1	0	0	1	0	-	-	-	-
Total			**22**	**4**	**8**	**34**	**30**				

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

SEMESTER-V

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1.	GD21B5C1	Game Idea Visualization and Story Telling	3	1	0	4	3	50	50	100	W
2.	GD21B5C2	Sound Design	3	1	0	4	3	50	50	100	W
3.	GD21B5C3	C# Programming	3	2	0	5	4	50	50	100	W
4.	GD21B5C4	Unity -I	4	0	0	4	4	50	50	100	W
5.	**Elective-I**		3	2	0	5	4	50	50	100	W
Laboratories/Studios/Practical											
6.	GD21B5P1	Unity – I Lab	0	0	4	4	4	50	50	100	P
7.	GD21B5P2	C# Programming Lab	0	0	4	4	4	50	50	100	P
Ability Enhancement Course											
8.	GD21B5K1	Entrepreneurial Skills	2	0	0	2	2	50	50	100	W
Open Elective											
9.	GD21B5O1	Open Elective	2	0	0	2	2	100	-	100	-
Total			**20**	**6**	**8**	**34**	**30**				

Elective –I

S.No	Course Code	Course Title
1	GD21B5E1	Artificial Intelligence
2	GD21B5E2	Computer Networks
3	GD21B5E3	Mobile Computing

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

SEMSETER-VI

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
	Professional Core										
1	GD21B6C1	Game Development and Documentation	3	2	0	5	4	50	50	100	W
2	GD21B6C2	Modeling, Texturing and Lighting Games	3	0	0	3	3	50	50	100	W
3	GD21B6C3	Database Management system	3	2	0	5	4	50	50	100	W
4	GD21B6C4	Augmented Reality (AR) and Virtual Reality (VR)	3	2	0	5	4	50	50	100	W
5	**Elective-II**		3	2	0	5	4	50	50	100	W
	Laboratories/Studios/Practical										
6	GD21B6P1	Unity-II Lab	1	0	4	5	5	50	50	100	P
7	GD21B6P2	3D Modelling Lab	0	0	4	4	4	50	50	100	P
Open Elective											
8	GD21B6O1	Open Elective	2	0	0	2	2	100	-	100	-
		Total	**18**	**8**	**8**	**34**	**30**				

Professional Elective -II

S.No	Course Code	Course Title
1	GD21B6E1	Cloud Computing
2	GD21B6E2	Data Science
3	GD21B6E3	Data Analytics

Note: W- Written, P- Practical, J-Jury

GD21B7IN - Industrial/ Research Internship mandatory after VI Semester. Evaluation and credit allotment will be given during VIII semester

SEMESTER -VII

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1.	GD21B7C1	Game Production Planning and Design	3	1	0	4	3	50	50	100	W
2.	GD21B7C2	Rigging and Animation for Games	3	0	0	3	3	50	50	100	W
3.	GD21B7C3	**Visual Effects(FX)**	3	1	0	4	3	50	50	100	W
4.	GD21B7C4	Quality Assurance for Games	3	1	0	4	3	50	50	100	W
5.	GD21B7C5	Game Mechanics	3	1	0	4	3	50	50	100	W
Laboratories/Studios/Practical											
6.	GD21B7P1	Rigging and Animation Lab	0	0	4	4	4	50	50	100	P
7.	GD21B7P2	Unity-III Lab	0	0	4	4	4	50	50	100	P
Mini Project											
8.	GD21B7MP	Theft Auto-II & III Mini Project	0	2	3	5	4	100	-	100	P
Open Elective											
9.	GD21B7O1	Open Elective	2	0	0	2	2	100	-	100	-
Skill Enhancement Course											
9	GD21B7K1	SWAYAM / NPTEL	0	0	0	0	1	-	-	-	NIL
		Total	**17**	**6**	**11**	**34**	**30**				

Note: W- Written, P- Practical, J-Jury (all Practical and Jury semester end exams will be followed by Viva- Voce or time problem along with viva-voce)

SEMESTER - VIII

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	S	P	Total		Int	Ext	Total	W/P/J
1	GD21B8IN	Internship	-	-	-	-	10	100	-	100	P
2	GD21B8PW	Major Project	-	-	-	-	20	100	100	200	P
		Total					**30**				

SYLLABUS

SEMESTER I

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T / S	P	Total		Int	Ext	Total	W/P/J
10.	CC21B1G1	Mathematics-I	3	2	0	5	4	50	50	100	W
11.	GD21B1G2	English-I	3	0	2	5	5	50	50	100	W
Professional Core											
12.	GD21B1C1	History of Gaming	3	2	0	5	4	50	50	100	W
13.	GD21B1C2	C Programming	4	0	0	4	4	50	50	100	W
Laboratories / Studio / practical											
14.	GD21B1S1	Fundamentals of Art	3	2	0	5	5	50	50	100	J
15.	GD21B1P1	C Programming for problem solving Lab	0	0	4	4	4	50	50	100	P
16.	GD21B1P2	Computer Applications	3	0	2	5	4	50	50	100	P
Mandatory Course											
17.	MC21B101	UHV-I(AICTE)	1	0	0	1	0	-	-	-	Nil
		Total	**20**	**6**	**8**	**34**	**30**				

* Note: W- Written, P- Practical, J - Jury

(All Practical semester end exams will be followed by Viva- Voce)

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
I	CC21B1G1	Mathematics – I	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To Identify special properties of a matrix, such as eigen values, Eigen vectors, etc., and use this information to facilitate the calculation of matrix characteristics.	2, 4	2, 3
CO2	To gain knowledge on various properties of quadratic forms of matrices.	2, 4	2, 3
CO3	To Analyze and acquire knowledge of functions by using various mean value theorems.	2, 4	2, 3
CO4	To Analyze and acquire knowledge on differential equations of first order first degree.	2, 4	2, 3
CO5	To understand the Properties of multivariable calculus and vector Differentiation.	2, 4	2, 3
CO6	To understand the solutions for various Partial differential equations and Properties of curves of best fit to the given data.	2, 4	2, 3

MODULE – I

Matrices: Rank of a matrix by echelon form, Normal form, solving system of homogeneous and non-homogeneous linear equations, Eigen values and Eigen vectors and their properties. Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem.

MODULE – II

Quadratic forms of matrices: Diagonalization of a matrix, Symmetric, Skew – Symmetric, Orthogonal, Hermitian, Skew Hermitian and unitary matrices and their properties. Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE – III

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

MODULE – IV

Differential equations of first order and first degree: Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay.

MODULE – V

Multivariable Calculus: Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Vector differentiation: Scalar and vector point functions, vector operator del, del applies to scalar point

functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.
MODULE – VI
Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method. **Curve fitting:** Fitting a straight line – Second degree curve –Exponential curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule Simpson's 3/8 Rule.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
3. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
4. A Text Book of Engineering Mathematics, Vol–II, T. K. V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers,2013.
4. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
5. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
6. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
I	GD21B1G2	English - I	3	0	2	5	50	50	100

Cos	COURSE OUTCOMES	POs	BTLs
	The student will be able to		
CO1	Use English Language effectively in spoken and written forms.	6,10,12	2,3
CO2	Comprehend the given texts and respond appropriately.	10	4,5
CO3	Communicate confidently in various contexts and different cultures.	6,10,12	2,4
CO4	Acquire basic proficiency in English including reading and listening comprehension,writing and speaking skills.	10,12	2,3,4
CO5	Demonstrate their understanding of writing as a series of tasks, including finding, evaluating, analyzing, and synthesizing sources and as a process that involves planning, drafting, revising, and editing.	4,6,10	3,4,6
CO6	Summarize information from academic sources, distinguishing between main ideas and details.	10,12	4,5

MODULE –I

"**The Raman Effect"** from the prescribed textbook „English for Engineers" published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Analysis of sentences- Transformation and Synthesis of sentences- Assertive to Negative and vice versa; Interrogative to Assertive/Negative and vice versa.

MODULE –II

"**Ancient Architecture in India"** from the prescribed textbook „English for Engineers" published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Writing: Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents- Format of a Formal Letter-Writing Formal Letters eg., Letter of Complaint, Letter of Requisition, Job Application with Resume.

MODULE –III

"The Man Who Carved a Road through the Mountain" by Josceline Anne Mascarenhas January 16, 2015 (Source: Internet) **Vocabulary**: Lexical set of words- Formation of hints with lexical set of words- Usage of lexical sets in framing of meaningful sentences. **Grammar**: Conversion of lexical words into meaningful paragraphs. **Reading**: Reading and Its Importance- Techniques for Effective Reading- Improving Comprehension Skills-Techniques for Good Comprehension- Sub-skills of Reading- Skimming, Scanning, Intensive Reading, and Extensive Reading- Exercises for Practice **Writing**: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence
MODULE –IV
"**What Should You Be Eating"** from the prescribed textbook „English for Engineers" published by Cambridge University Press. **Vocabulary**: Standard Abbreviations in English **Grammar**: Redundancies and Clichés in Oral and Written Communication. **Writing**: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.
MODULE –V
"**How a Chinese Billionaire Built Her Fortune"** from the prescribed textbook „English for Engineers" published by Cambridge University Press. **Vocabulary**: Technical Vocabulary and their usageGrammar: Common Errors in English **Writing**: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.
MODULE-VI
"BLUE JEANS" from the prescribed textbook „English forEngineers" published by Cambridge University Press. Prefixes and Suffixes, Idioms and Phrasal verbs. Articles, Tenses, and its forms Sub skills of Reading- Skimming and Scanning Essay writing and Describing Objects, Places and Events

Textbook:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.

ENGLISH -LAB

MODULE-1
• Listening Skills • Phonetics • Introducing oneself
MODULE– II
• Describing objects • JAM / Interpretation of Hypothetical Situations • Role play
MODULE – III
• Hypothetical situations (If…….. were) • Elocution • TED talks videos
MODULE– IV
• Visual Description • Situational conversations
MODULE– V
• Oral Presentations • PowerPoint presentations

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.

2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
I	GD21B1C1	History of gaming	3	2	0	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Describes the types of games found in arcades before video games Discuss how the first video games were received by the public Be familiar with the Nintendo color TV game series To know the innovations brought to gaming during this period Summarizes first generation market sales and trends	3,4	1,2
CO2	Summarizes the main internal components of a pc and video game console Understand the basic on how a pc and video game console work Be familiar with types of network	3,4	1,2
CO3	Game industry focus on pertinent aspects of video games such as video game business Technology Summarizes Game industry values such as development of video games to publish and generate funding	3,4	1,2
CO4	Describes the arcade industry for its respective era which for many generations served as Gaming in DOS and windows Consoles are then discussed in detail on their history, technical specifications, break through and trends	3,4	1,2
CO5	Describes the use of video games in military, science and educational communities	3,4	1,2
CO6	Describes the mobile and casual games in Game industry market sales and trends	3,4	1,2

MODULE – 1

The first video games:

Objectives, key terms and people, first generation, TimeLine, the beginning, the first interactive computer games, Tennis for two space war, colour TV game series, first generation break throughs and trends

MODULE – II

Behind the Technology Behind the Technology:

Introduction, under the hood, CPU, Ram and Rom,Bios,graphics and sound cards, ports, making the connection, Bits and Bytes,Hertz and frame rate, Types of moniters,video formats, ASCII and vector graphics, Raster and polygon graphics.

MODULE – III

Video Games Become Big Business: Game industry value, chain, funding, publishing, Development, manufacturing,Distribution,Retail,Data Research, End users, Big business, video game conventions, sports
MODULE – IV
The Rise of pc Gaming: Computer mile stones, Timeline, Introduction,End of an ERA,IBM and the rise of clones, Gaming in DOS,Genre pioneers: Early 1990s,windows 95 and the mid-1990s,virtual online worlds, Recent Trends, Market summary.
MODULE – V
Military Science and Education Climb Aboard: Early war games, military Simulation, The Bradly Trainer, Multipurpose Arcade, video games in science, serious games, serious games showcase and challenges, Games with a purpose, video games Research, Negative side effects, positive Impact, Brain development
MODULE – VI
Mobile and Casual Change the Game: Mobile platform, Timeline, Introduction, mobile and casual games, Defined, phones get smart, mobile gaming origins, The New millennium of mobile, Nokia -N-Gage, The competition key-N- Gage Tiles, other mobile developments, Gizmodo, Early I-phone games, mobile milestones, Recent trends

Text books:

1. The video games text book Dr.brian j.wardyga

Reference Books:

1. Changing the Game: How Video Games Are Transforming the Future of Business by David Edery and Ethan Mollick
2. Innovation and Marketing in the Video Game Industry: Avoiding the Performance Trap by David Wesley and Gloria Barczak
3. Online Game Pioneers at Work by Morgan Ramsay

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
I	GD21B1C2	C Programming	4	0	0	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Formulate simple algorithms for arithmetic and logical problems and to translate algorithms to programs (in C Language).	3,4	1, 2
CO2	Understand inputs, outputs and which operators are used.	3,4	1, 2,3
CO3	Use loops and functions to solve the given problem and Implement different Operations on array.	3,4	1, 2,3,4
CO4	Use functions to solve the given problem and Implement different Operations on arrays.	3,4	1, 23,4
CO5	Understand structures, unions, and pointers.	3,4	2,3,4,5
CO6	To understand different file handling functions and preprocessor directives.	3,4	2.3.4.5

MODULE – I

Introduction and first Program: Why Programming, Types of Programming, Introduction to C, Benefits of C, Some Facts about C, Understanding First C Program, Executing using IDE.

Variables and Data Types: Identifiers, Keywords, Data Types, Variables, Constants

MODULE – II

Console IO Operations: printf function, scanf function, Unformatted Functions.

Operators and Expressions: Expressions, Types of Operators, Type Casting.

Control Flow Statements: Decision Making in C, If Statement, Switch Statement, Unconditional Branching, While Loop, Do…While Loop, For Loop.

MODULE – III

Working with Functions: What is a Function, Benefits of a Function, Function Terminology, Array of Structures, how does Function Works, Scope and Lifetime of Variables in function, Storage Classes of Variables, Call by value and call by reference, Recursion.

MODULE – IV

Working with Arrays: Understanding Arrays, Arrays Declaration and Initialization, Sample Programs, Multidimensional Arrays, Arrays and Functions.

String Handling: Declaration and Initialization, Reading and Writing Strings, Standard string library functions, Array of pointers to string.

MODULE – V

Pointers: Understanding Pointers, Declaring and Initializing Pointers, Function and Pointer Parameters, Pointer Arithmetic, Pointer and Arrays, Two Dimensional Arrays and Pointers, void Pointer, Dynamic allocation of memory, Difference between malloc and calloc.

Structures and union: overview of Structures, Defining and Using a Structure, Structures within a Structure, typedef keyword, Passing Structures to Functions, Structure and Pointers, Unions.

MODULE – VI

File Handling: What is a Stream, Opening and Closing of Files, Writing and Reading in Text Format, Writing and Reading in Binary Format.

Pre-Processor Directives: Pre-Processor Directives, #define Macro, Conditional Compilation,Pre-defined Macros, #include and Header Files.

Command Line Arguments and Variable Number of Arguments: Command Line Arguments, Variable Arguments.

Textbooks:

1. E. Balagurusamy, C Programming and Data structures, Fourth Edition,McGraw-Hill.
2. Remo Theraja , Programming in C, second edition, Oxford.
3. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
4. Programming in C and Data Structures, J.R. Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
5. Fundamentals of Data structures in C, 2nd Edition, Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
6. Data structures A Programming Approach with C, D.S. Kushwaha and A.K. Misra , PHI.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
I	GD21B1S1	Fundamentals of Art	3	0	2	5	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the f fundamentals of drawing visual art work relies on the lines ,shapes ,volumes ,value ,color	3,4	1,2
CO2	To acquire the knowledge on Anatomy six stages of Rendering Anatomy	3,4	1,2
CO3	To gain the kknowledge on Elements of design such as frame ,camera ,angle ,scale ,grouping ,line ,shapes etc.	3,4	1,2
CO4	To understand the importance of character Design drawing and model sheet	3,4	1,2
CO5	To understand Environment design, shapes, Building construction in the fundamental art drawing	3,4	1,2
CO6	To understand the adding color with digital tools and professional portfolios in the fundamental art drawing concepts for video game design using materials	3,4	1,2

MODULE – I

Fundamentals:

Materials Basic pencil Techniques ,Basic perspective ,Basic volumes ,Basic Lighting and values ,visual measuring tools, Drawing process

MODULE – II

Anatomy :

Six stages for Rendering Anatomy

The foot ,The leg ,The pelvis ,The Arm ,The Hand ,The Head and Neck ,Facial Expressions

MODULE – III

Elements of design:

Frame, camera Angle, scale, Grouping, Lighting, Line, Shapes, subverting conventions

MODULE – IV

Character Design:

Good studio practice, Brainstorming and character concept, visual metaphors, mind map, Research, and mood board, Thumbnail Development, final character drawing and model sheet.

MODULE – V

Environment Design:

Character/Environment shapes , Building construction ,character centric Environment Design ,Top down

Environment Design
MODULE – VI
Color, adding color with digital tools, Fundamentals of Color Science: Defining Color, Early views on color, Newton the spectrum and colored light, light and color, color mixing, color vision and color theories, color and science versus Art, the nature of light.

Text books:

1. Drawing Basics and video game Art : Classic to cutting edge Art techniques for video games design by Chris solarski
2. Color for Sciencce, Art and Technology by Kurt Nassau.

Reference Books:

1. Art Fundamentals: Color, Light, Composition, Anatomy, Perspective, and Depth" by 3DTotal Team and Gilles Beloeil

2. Design Elements, Color Fundamentals: A Graphic Style Manual for Understanding How Color Affects Design" by Aaris Sherin

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
I	GD21B1P1	C Programming for problem solving Lab	0	0	4	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Formulate simple algorithms for arithmetic and logical problems and to translate algorithms to programs (in C Language).	3,4	1, 2
CO2	Understand inputs, outputs and which operators are used.	3,4	1, 2,3
CO3	Use loops and functions to solve the given problem and Implement different Operations on array.	3,4	1, 2,3,4
CO4	Use functions to solve the given problem and Implement different Operations on arrays.	3,4	1, 23,4
CO5	Understand structures, unions, and pointers.	3,4	2,3,4,5
CO6	To understand different file handling functions and preprocessor directives.	3,4	2.3.4.5

Operators and Evaluation of Expressions

1. Write a C Program to check whether a number is even or odd using ternary operator

2. Write a C Program to perform the addition

3. Write a C program to evaluate the arithmetic expression ((a + b / c * d - e) * (f - g)). Read the values a, b, c, d, e, f, g from the standard input device.

4. Write a C program to find the sum of individual digits of a 3-digit number.

5. Write a C program to read the values of x and y and print the results of the following expressions in one line: i.(x + y) / (x - y)

ii. (x + y)(x - y)

CONTROL STRUCTURES

1. Write a C program to find the sum of individual digits of a positive integer.

2. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

4. A character is entered through keyboard. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if-else and switch case. The following table shows the range of ASCII values for various characters.

Characters	**ASCII values**
A – Z	65 – 90
a – z	97 – 122
0 – 9	48 – 57
Special symbols	0 – 47, 58 – 64, 91 – 96, 123 – 127

5. Write a C program, which takes two integer operands and one operator from the user, performs the operation, and then prints the result. (Consider the operators +, -, *, /, % and use switch statement).

6. Write a C program to calculate the following sum: sum = $1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$

7. Write a C program to print the numbers in triangular form

1

1 2

1 2 3

1 2 3 4

ARRAYS

1. Write a C program to find the second largest integer in a list of integers.

2. Write a C program to perform the following:

i. Addition of two matrices

i. Multiplication of two matrices

3. Write a C program to count and display positive, negative, odd, and even numbers in an array.

4. Write a C program to merge two sorted arrays into another array in a sorted order.

5. Write a C program to find the frequency of a particular number in a list of integers.

STRINGS

1. 1.Write a C program that uses functions to perform the following operations:

i.To insert a sub string into a given main string from a given position.

ii. To delete n characters from a given position in a given string.

2. Write a C program to find a string within a sentence and replace it with another string.

3. Write a C program to determine if the given string is a palindrome or not.

4. Write a C program that reads a line of text and counts all occurrence of a particular word

5. Write a C program that displays the position or index in the string S where the string T begins, or 1 if S doesn't contain T.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

FUNCTIONS
1. Write C programs that use both recursive and non-recursive functions i. To find the factorial of a given integer. i. To find the greatest common divisor of two given integers.
2. Write C programs that use both recursive and non-recursive functions i. To print Fibonacci series. i. To solve towers of Hanoi problem
3. Write a C program to print the transpose of a given matrix using function
4. Write a C program that uses a function to reverse a given string.
POINTERS
1. Write a C program to concatenate two strings using pointers.
2. Write a C program to find the length of string using pointers.
3. Write a C program to compare two strings using pointers.
4. Write a C program to copy a string from source to destination using pointers.
5. Write a C program to reverse a string using pointers.
STRUCTURES AND UNIONS
1. Write a C program that uses functions to perform the following operations: i. Reading a complex number i. Writing a complex number i. Addition and subtraction of two complex numbers v. Multiplication of two complex numbers. Note: represent complex number using a structure.
2. Create a Book structure containing book_id, title, author name and price. Write a C program to pass a structure as a function argument and print the book details.
3. Create a union containing 6 strings: name, home address, hostel address, city, state, and zip. Write a C program to display your present address.
4. Write a C program to define a structure named DOB, which contains name, day, month, and year. Using the concept of nested structures display your name and date of birth.
PREPROCESSOR DIRECTIVES
1. Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro to compute the volume for spheres of radius 5, 10 and 15 meters.
2. Define a macro that receives an array and the number of elements in the array as arguments. Write a C program for using this macro to print the elements of the array.

3. Write symbolic constants for the binary arithmetic operators +, -, *, and /. Write a C program to illustrate the use of these symbolic constants
FILES
1. Write a C program to display the contents of a file
2. Write a C program to copy the contents of one file to another.
3. Two files DATA1 and DATA2 contain sorted lists of integers. Write a C program to merge the contents of two files into a third file DATA i.e., the contents of the first file followed by those 4. of the second are put in the third file.
5. Write a C program to count the no. of characters present in the file.
COMMAND LINE ARGUMENTS
1. Write a C program to read arguments at the command line and display it.
2. Write a C program to read two numbers at the command line and perform arithmetic operations on it.
3. W rite a C program to read a file name at the command line and display its contents

References Books:

1. Yashavant Kanetkar, "Let Us C", BPB Publications, New Delhi, 13th Edition, 2012.
2. Oualline Steve, "Practical C Programming", O'Reilly Media, 3rd Edition, 1997.
3. King K N, "C Programming: A Modern Approach", Atlantic Publishers, 2nd Edition, 2015.
4. Kochan Stephen G, "Programming in C – A Complete Introduction to the C Programming Language", Sam's Publishers, 3rd Edition, 2004.
5. Linden Peter V, "Expert C Programming: Deep C Secrets", Pearson India, 1st Edition, 1994.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
I	GD21B1P2	COMPUTER APPLICATIONS LAB	3	0	2	5	50	50	100

COs	COURSE OUTCOMES	POs	BTLs
	The student will be able to		
CO1	Apply knowledge for computer assembling and software installation and solve trouble shooting problems.	1,2,4,5	
CO2	Prepare the Documents using Word processors.	1,5	
CO3	Prepare spread sheets for calculations using excel.	1,5	
CO4	Prepare Slide presentations using the presentation tool and prepare different multimedia presentations using different media and possible settings.	1,2,5	
CO5	Understand basic concepts of databases, create, manipulate, and add features using MS Access	4,5,12	
CO6	Understand the basic concepts of MS Paint	1,2,3,4,5	

MODULE -I

Introduction Computer: Definition - Characteristics and Limitations of Computer—Generations of Computer, Classification of Computers, Applications of Computer, Basic Components of PC, Computer Architecture - Primary and Secondary Memories- Input and Output Devices- Operating System, Function of Operating System- Types of Operating System- Languages and its Types

MODULE - II

MS Word: Word Processing – Features-Advantages and Applications- Parts of Word Window-Tool bar Creating, Saving, Closing, Opening and Editing of a Document-Moving and Coping a Text ,Formatting of Text and Paragraph- Bullets and Numbering-Find and Replace - Insertion of objects-Headers and Footers-Page Formatting- Auto Correct- Spelling and Grammar- Mail Merge- Macros

MODULE-III

MS Excel: Features – Spread Sheet-Workbook – Cell-Parts of a window-Saving, Closing, Opening of a Workbook – Editing – Advantages – Formulas- Types of Function-Templates – Macros – Sorting- Charts –Filtering.

MODULE-IV
MS PowerPoint: Introduction – Starting – Parts-Creating of Tables- Create Presentation – Templates-Auto Content Wizard-Slide Show-Editing of Presentation-Inserting Objects and charts
MODULE -V
MS Access: Orientation to Microsoft Access - Create a Simple Access Database - Working with Table Data - Modify Table Data - Sort and Filter Records - Querying a Database - Create Basic Queries - Sort and Filter Data in a Query - Perform Calculations in a Query - Create Basic Access Forms - Work with Data on Access Forms - Create a Report - Add Controls to a Report – Format reports
MODULE -VI
MS Paint: Home Menu, Select ,Free-Form Select, Eraser/color Eraser, Fill with color,Magnifier,Pencil, Brush, Air Brush,Text,Shapes:Line,Curve,Rectangle,Polygon,Ellipse,RoundedRectangle, View Menu, zoom in, Zoom Out, Full Screen. **Internet concepts**: Introduction to Internet, Hyper Text Mark-up Language, introduction to basic features and uses of Java, VB

Textbooks:

1. P. Mohan computer fundamentals- Himalaya Publications.
2. R.K. Sharma and Shashi K Gupta, Computer Fundamentals - Kalyani Publications
3. Fundamentals of Computers By Balagurusamy, McGraw Hill
4. Computer Fundamentals Anita Goel Pearson India
5. Introduction to Computers Peter Norton
6. Fundamentals of Computers Rajaraman V Adabala N

Reference Books:

1. Office 2010 All-in-One for Dummies Peter Weverka
2. MS-Office S.S. Shrivastava
3. MS-OFFICE 2010 Training Guide Prof. Satish Jain, M. Geetha, KratikaBPB Publications

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
I	MC21B101	UHV-1 Student Induction Program (mandatory AICTE)	1	0	0	0	-	-	-

COs	Course Outcomes	POs	BTLs
	The Student Induction Program (SIP) The 3-week Student Induction Program (SIP) is to prepare newly admitted undergraduate students for the new stage in their life by facilitating a smooth transition from their home and school environment into the college and university environment through various discussions and activities. The SIP has been formulated with specific goals to help students to:		
CO1	Become familiar with the ethos and culture of the institution (based on institutional culture and practices)	**NA**	**NA**
CO2	Set a healthy daily routine, create bonding in batch as well as between faculty members and students	**NA**	**NA**
CO3	Get an exposure to a holistic vision of life, develop awareness, sensitivity and understanding of the Self---family---Society---Nation---International---Entire Nature	**NA**	**NA**
CO4	Facilitate them in creating new bonds with peers and seniors who accompany them through their college life and beyond	**NA**	**NA**
CO5	Overcome weaknesses in some essential professional skills – only for those who need it (e.g. Mathematics, Language proficiency modules)	**NA**	**NA**

The various modules or core areas recommended for the 3-week SIP are:

SIP Module 1: Universal Human Values I (UHV I) 22 hours

The purpose is to help develop a holistic perspective about life. A self-reflective methodology of teaching is adopted. It opens the space for the student to explore his/her role (value) in all aspects of living – as an individual, as a member of a family, as a part of the society and as an unit in nature. Through this process of self-exploration, students are able to discover the values intrinsic in them. The session wise topics are given below:

Session No	Topic Title	Aspirations and Issues	Basic Realities (underlying harmony)
1	Welcome and Introductions	Getting to know each other	Self-exploration
2 and 3	Aspirations and Concerns	Individual academic, career… Expectations of family, peers, society, nation… Fixing one's goals	Basic human aspirations Need for a holistic perspective Role of UHV
4 and 5	Self-Management	Self-confidence, peer pressure, time management, anger, stress… Personality development, self-simprovement…	Harmony in the human Being
6 and 7	Health	Health issues, healthy diet, healthy lifestyle Hostel life	Harmony of the Self and Body Mental and physical Health
8, 9, 10 and 11	Relationships	Home sickness, gratitude towards parents, teachers and others Ragging and interaction Competition and cooperation Peer pressure	Harmony in relationship Feelings of trust, respect… gratitude, glory, love
12	Society	Participation in society	Harmony in the society
13	Natural Environment	Participation in nature	Harmony in nature/existence
14	Sum Up	Review role of education Need for a holistic perspective	Information about UHVII course, mentor and buddy
15	Self-evaluation and Closure	Sharing and feedback	

SIP Module 2: Physical Health and Related Activities

This module is intended to help understand the basic principles to remain healthy and fit and practice them through a healthy routine which includes exercise, games etc.

SIP Module 3: Familiarization of Department/ Branch and Innovation

This module is for introducing and relating the student to the institution/department/branch; how it plays a role in the development of the society, the state, region, nation and the world at large and how students can participate in it.

SIP Module 4: Visit to a Local Area

To relate to the social environment of the educational institution as well as the area in which it is situated through interaction with the people, place, history, politics…

SIP Module 5: Lectures by Eminent People

Listening to the life and times of eminent people from various fields like academics, industry etc. about careers, art, self-management and so on enriches the student's perspective and provides a holistic learning experience.

SIP Module 6: Proficiency Modules

This module is to help fill the gaps in basic competency required for further inputs to be absorbed. It includes effort to make student proficient in interpersonal communication and expression as well as awareness about linguistic and thereafter NLP.

SIP Module 7: Literature / Literary Activities

Through the exposure of local, national and international literature, this module is aimed at helping the student learn about traditional as well as contemporary values and thought.

SIP Module 8: Creative Practices

This module is to help develop the clarity of humanistic culture and its creative, joyful expression through practice of art forms like dance, drama, music, painting, pottery, sculpture etc.

SIP Module 9: Extra Curricular Activities

This is a category under which things that are not placed in any of the above may be placed. Some clubs and hobby group may be made for each of the above categories, so that students may pursue them even after SIP.

The recommended hours to be allocated are given above. Depending on the available faculty, staff, infrastructure, playgrounds, class timings, hostellers and day scholars etc., the timetable for these activities may be drawn up. Of course, colleges may conduct an inaugural function at the beginning of the SIP; and they may also conduct a celebratory closing ceremony at the end of the SIP. In particular during the lockdown phase, appropriate care may be taken and some or all activities may be planned in distance-learning or on-line mode.

Implementation:

The institution is expected to conduct the 3-week SIP under the guidance of the Director/Principal or Dean Students or a senior faculty member. For this, the institution is expected to make an SIP Cell. The SIP Cell will be responsible for planning, and then implementation of the SIP.

Follow up:

The SIP is only the beginning of the interaction with newly joined students.

An important part of the SIP is to associate one faculty mentor to every small group of about 20 students; and also associate one senior student buddy to an even smaller groups of about 5 students for the guidance required for holistic development of the newly joined student throughout his/her time in the institution/college.

These activities are to be continued in the ongoing academic program along with other cultural activities through the Student Activity Cell (SAC).

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER II

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T/S	P	Total		Int	Ext	Total	W/P/J
1	CC21B2G1	Mathematics-II	3	2	0	5	4	50	50	100	W
2	GD21B2G2	Communication Skills	3	2	0	5	4	50	50	100	W
Professional Core											
3	GD21B2C1	Fundamentals of Game Design	4	0	0	4	4	50	50	100	W
4	GD21B2C2	Computer Organization	4	0	0	4	4	50	50	100	W
5	GD21B2C3	Data Structures	4	0	0	4	4	50	50	100	W
Laboratories / Studio / practical											
6	GD21B2S1	3D Art and Design Fundamentals	2	3	0	5	5	50	50	100	J
7	GD21B2P1	Data structures Lab	0	2	4	6	5	50	50	100	P
Mandatory Course											
8	MC21B201	Environmental Studies	1	0	0	1	0	-	-	-	Nil
		Total	**21**	**9**	**4**	**34**	**30**				

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
II	CC21B2G1	Mathematics – II	3	1	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To solve problems involving various types of particular integrals in differential equations of vector functions	2, 4	2, 3
CO2	Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function.	2, 4	2, 3
CO3	To understand various Properties of Numerical solution of ordinary differential equations and Transcendental Equations.	2, 4	2, 3
CO4	To Understand the concept and properties of Laplace transforms and their application	2, 4	2, 3
CO5	To solve the problems related and solve the problems related to various distributions in probability.	2, 4	2, 3
CO6	To apply hypothesis and significance testing of data in various engineering applications.	2, 4	2, 3

MODULE - I

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration, Line integral, potential function – Area, Surface and volume integrals

Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (excluding their proof). Verification of Green's – Stoke's and Gauss's Theorems.

MODULE - II

Fourier Series: Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series.

MODULE - III

Numerical solution of Ordinary Differential equations: Solution by Taylor's series - Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Method.

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Iteration Method – Newton-Raphson Method.

MODULE - IV

Laplace Transforms: Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac"s delta function – Convolution theorem – Laplace transform of Periodic function.
Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

MODULE - V

Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Theorem. Random variables – Discrete and continuous Distributions
Binomial, poisson's distributions and Normal distribution – Related properties.

MODULE - VI

Test of Hypothesis: Means – Hypothesis concerning one and two means– Type I and Type II errors. One-tail, two-tail tests.
Tests of significance: Student's t-test, F-test, Ψ^2 test. (testing of goodness of fit and independence).

Text Books:

1. Probability & Statistics, T.K.V. Iyengar, B. Krishan Gandhi and Others, S. Chand & Company.
2. Probability & Statistics, Ravindranath, B.S.R. Murthy, I.K.International Pvt. Ltd.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
4. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017..
5. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
6. A Text Book of Engineering Mathematics, Vol–II, T. K. V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.

Reference Books:

1. Probability & Statistics, Amold O. Allen, Academic Press.
2. Probability & Statistics, D.K. Murugesan & P. Guru Swamy, Anuradha Publications.
3. Introduction to Probability, Charles M. Grinstead, J. Laurie Snell, University Press.
4. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
5. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	S/F	P/T/O	Total	Int. Marks	Ext. Marks	Total Marks
II	GD21B2G2	Communication skills	4	0	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Provide an adequate mastery of technical and communicative English Language training primarily, reading and writing skills, and also listening and speaking skills.	9,10	2,3

MODULE - I

Communication: Importance of Communication; Elements of good individual communication; organizing oneself; different types of communication; Barriers in the path of Communication.

MODULE - II

Listening skills: Listening to conversation and speeches (Formal and Informal) Reading: Techniques of reading, skimming, Scanning, SQ3R technique.

MODULE - III

Creative Writing: Scope of creative writing; Writing skills Signposting, Outlines, Rephrasing.
Writing a report/ format of the report; Paragraph, Letter Writing, Essay writing, Memo, Circular, Notice, Cover Letter, Resume, Writing with a thesis, Summary, Précis, Product description – Description of projects and features.

MODULE - IV

Oral Report; Periodical Report; Progress Report; Field Report
Preparation of minutes; Video conference; Tele conference / Virtual meeting.

MODULE - V

Speaking: How to converse with people, How to communicate effectively; Language and grammar skills; Pronunciation drills, Phonetics, vowels, Diphthongs, consonants, Stress, Rhythm and intonation, Conversational skills Features of effective speech- practice in speaking fluently –role play – telephone skills – etiquette.

Short Extempore speeches – facing audience – paper presentation – getting over nervousness – Interview techniques – preparing for interviews – Mock Interview –Body Language.

MODULE - VI
Impact of internet on communication; communication through computers. voice mail; broadcast messages; e-mail auto response; etc.

Reference books:

1. Krishna Mohan &Meera Banerji: Developing Communication Skills Macmillan India.
2. C S Rayudu: Principles of Public Relations, Himalaya Publishing House.
3. K. Ashwathappa: Organizational Behavior, Himalaya Publishing House.
4. Daniel Colman: Emotional Intelligence.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
II	GD21B2C1	Fundamentals of Game Design	4	0	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To learn Game Essentials, Types of Games, Stages of Design process	2,3	1, 2, 5
CO2	To understand requirements of designing a game	2,3	1, 2, 4, 5
CO3	To learn how a concept turns into a game, and game world	2,3	1, 2, 4
CO4	To create a expressive play, characters in the game	2,3	1, 2, 6
CO5	To understand what a storytelling is, various components of storytelling	2,3	1, 2, 5
CO6	To learn general principles of level design and design issues of online gaming	2,3	1, 2, 4

MODULE - I

Games and Video Games: What Is a Game? Conventional Games Versus Video Games, Games for Entertainment, Serious Games

Designing and Developing Games: An Approach to the Task, Key Components of Video Games, The Structure of a Video Game, Stages of the Design Process, Game Design Team Roles, Game Design Documents, The Anatomy of a Game Designer

MODULE - II

The Major Genres: What Is a Genre? The Classic Game Genres

Understanding Your Player: VandenBerghe's Five Domains of Play, Demographic Categories, Gamer Dedication, The Dangers of Binary Thinking

Understanding Your Machine: Home Game Consoles, Personal Computers, Portable Devices

Other Devices

MODULE - III

Game Concepts: Getting an Idea, From Idea to Game Concept

Game Worlds: What Is a Game World? The Purposes of a Game World, The Dimensions of a Game World, Realism

MODULE - IV

Creative and Expressive Play: Self-Defining Play, Creative Play, Other Forms of Expression, Game Modifications

Character Development: The Goals of Character Design, The Relationship Between Player and Avatar, Visual Appearances, Character Depth, Audio Design

MODULE - V
Storytelling: Why Put Stories in Games? Key Concepts, The Storytelling Engine, Linear Stories, Nonlinear Stories, Granularity, Mechanisms for Advancing the Plot, Emotional Limits of Interactive Stories, Scripted Conversations and Dialogue Trees, When to Write the Story, Other Considerations
MODULE - VI
General Principles of Level Design: What Is Level Design? Key Design Principles, Layouts, Expanding on the Principles of Level Design, The Level Design Process, Pitfalls of Level Design **Design Issues for Online Gaming:** What Are Online Games? Advantages of Online Games, Disadvantages of Online Games, Design Issues, Technical Security, Persistent Worlds, Social Problems

Textbooks:

1. Fundamentals of Game Design, Third Edition, by Ernest Adams, Released December 2013, Publisher(s): New Riders, ISBN: 9780133435726

Reference Books:

1. Designing Games, A Guide to Engineering Experiences by Tynan Sylvester.
2. Game Design Essentials by Briar Lee Mitchell.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
II	GD21B2C2	Computer Organization	4	0	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Understand the basic concepts of computer and data representation	1,2,10	
CO2	Perform arithmetic operations of binary number system.	1,2,3,4, 8,10	
CO3	Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.	2,8,9,10	
CO4	Understand the concept to explore the different types for memory unit	1,2,3,4, 5,6,7,8, 9	
CO5	Use memory and I/O devices effectively and Multi processors	2,8,6	
CO6	To understand the concept of pipelined concept.	2,10	

MODULE – I

Basic concepts of computers: Computer Types, Functional units, Basic operational concepts, Bus Structures, Performance. **Data Representation-** Fixed Point Representation, Floating Point Representation

MODULE – II

Register Transfer and Microoperations: Register Transfer, Bus and memory transfers.Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

MODULE – III

Basic computer organization and Design: Instruction codes, Computer instructions, Memory reference instructions, Input – Output and Interrupt, Addressing modes. **Micro programmed Control:** Control memory, Address sequencing, Micro program example, Design of control unit, Hard wired control, Micro programmed control. **Computer Arithmetic:** Addition and subtraction, multiplication Algorithms, Division Algorithms.

MODULE – IV

Memory: Some Basic Concepts, Semiconductor RAM Memories, Internal Organization of memory chips, Static Memories, Asynchronous DRAMs, Synchronous DRAMs, Structure of larger memories, Memory system consideration, Rambus memory, Read-Only Memories- ROM, PROM, EPROM, EEPROM, Flash

Memory, Speed, Size and Cost, Cache Memories.
MODULE – V
Input-Output Organization: Peripheral Devices, Input- Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access (DMA). **Multiprocessors:** Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Inter Processor Communication and Synchronization
MODULE – VI
Pipelining- Introduction, pipeline principles-linear pipeline processor-Asynchronous model, synchronous model, Non linear pipeline processor, classification of pipeline processor

Text Books:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.
3. Fundamentals of Computer Organization and Design, - Sivaraama Dandamudi, Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition, Elsevier.
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
II	GD21B2C3	Data Structures	3	2	0	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand the variety of abstract data types and data structures.	3,4	1, 2
CO2	Analyze data structures such as linked list, Stacks and Queues	3,4	1, 2,3
CO3	Apply and analyze tree traversal algorithms and graph traversal algorithms	3,4	1, 2,3,4
CO4	Apply and analyze Priority Queues and Binary Search Tree	3,4	1, 23,4
CO5	Analyze graph traversal algorithms and organize data using various sorting algorithms	3,4	2,3,4,5
CO6	Ability to understand the concept of hashing, B-Trees and B+-Trees	3,4	2.3.4.5

MODULE – I

Introduction: Data structures, Primitive & Non Primitive data structures, Linear &Non Linear data structures, Linear Lists: Definition, Arrays: Definition.

MODULE – II

Stacks: Definition, Array & Linked representations, Operations, Applications
Queues: Definition, Array & Linked representations, Operations, Circular Queues & Dequeues.

MODULE – III

Trees: Basic terminology, Binary Trees- Definition, Properties, Representation, Complete and Full Binary Tree.

Tree Traversal Algorithm: Inorder, Preorder and Post order.

MODULE – IV

Priority Queues: Definition, Heaps, Leftist Trees. Binary Search Tree (BST): Definition, Operations & Implementations, BST with Duplicates, Indexed BST. Balanced Search Trees: AVL, Red-Black & Splay Trees.

MODULE – V

Graphs: Terminology, Representations Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Minimum Spanning Tree. Sorting: Quick, Merge, Heap.

MODULE – VI

Dictionaries, Linear List Representation, Skip List Representation Hashing: Introduction, Hash Table representation, Hash Functions. Collisions: Introduction,Separate Chaining, Open Addressing, B-Trees, Operationson B-Trees,B+-

Trees.

Textbooks:

1. An Introduction to Data Structures with applications, Jean Paul Trembley and Paul G.Sorenson, McGrawHill.

2. Fundamentals of Data Structures in C, Horowitz,Sahni, Anderson Freed, Universitiespress.

3. Data Structures, Algorithms and Applications in C++, Ananda Rao Akepogu and Radhik Raju Palagiri, Pearson Education.

4. DataStructures using C++,Varsha H.Patil, Oxford University Press.

Reference books:

1. Data Structures and Algorithmsin C++, S.Sahni, University Press (India) Private Limited, Second Edition.

2. DataStructures, Seymour Lipschutz, Schaum's Outlines, McGrawHill.

3. DataStructures and Algorithms, G.A.V.Pai, TataMcGraw Hill.

4. DataStructures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

5. Data Structures and algorithms in C++,Mark Allen Weiss, Pearson Education Limited, Second Edition.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
II	GD21B2S1	3D Art and Design Fundamentals	2	0	3	5	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To learn Fundamentals of Art, Shades and Shadows	2,3	
CO2	To identify the different perspective view of objects	2,3,4,	
CO3	To Understand what concept art is and learn concept art skills	2,3	
CO4	To understand the importance of History of Architecture and Level Design	2,3	
CO5	To learn about the tools and techniques for Level Design	2,3	
CO6	To understand how to adapt real world concepts for Level Design	2,3	

MODULE - I

FUNDAMENTALS: Diminution, Foreshortening, Convergence, Overlapping Shades and Shadows, Colour and Value Perspective, Detail and Pattern Perspective, Focus Effect, Professional Applications of Fundamentals

SHADE AND SHADOW: Introduction, Parallel Light Rays (Sunlight) Parallel to Observer's Face, Parallel Light Rays (Sunlight) Oblique to Observer's Face, Shade and Shadow Created by Local Point Sources of Light, Application Sketches, Professional Examples

MODULE - II

REALITY AND APPEARANCE: In Perspective Drawing You Draw What You See, Not Your Idea or Mental Image of the Subject, Reality and Appearance–Example: United Nations Buildings from Different Viewpoints, Reality and Appearance–Example: Park Bench from Different Viewpoints

HOW WE SEE FOR PERSPECTIVE DRAWING: Cone of Vision, Central Visual Ray, Picture Plane, Basis of Perspective–Lines of Sight Through a Picture Plane.

MODULE - III

CONCEPT ART: What Is Concept Art? What does a concept artist do? Examples of Concept Art –, Character Design, Creature Design, Environment Design and Prop & Asset Design. How to Become a concept artist? Types of Concept Art, How Developers should utilize Concept Art.

MODULE - IV
LEVEL DESIGN: A Brief History of Architecture and Level Design – Breaking the Rules of Level Design, Elements of Architecture and Level Design, Functional Requirements, Usability, Delight.
MODULE - V
TOOLS AND TECHNIQUES FOR LEVEL DESIGN: Level Design Goals for creating Game Experiences, Adjustment of Behavior, Transmission of Meaning, Augmentation of Space.
MODULE - VI
REAL WORLD ADAPTIVE LEVEL DESIGN: Games with new contexts, Pervasive Games, Augmented Reality Games, Low-Tech Public Games, Adapting Level Design Goals, Real-World Level Design Goals.

Textbooks:

1. Perspective Drawing Handbookby Joseph D'Amelioseries Dover Art Instruction
2. An Architectural approach to Level Design, Christopher W.Totten.

Reference Books:

1. Perspective Drawing for Beginners by Len A. Doust
2. Perspective Made Easy by Ernest R. Norling.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
II	GD21B2P1	Data Structures Lab	0	0	4	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Implement the operations of various linear data structures.		
CO2	Implement the ADT of Stack and Queue.		
CO3	Implement the concept Inorder, Preorder and Postorder tree traversing techniques.		
CO4	Analyze and implement the Graph traversing methods and Sorting algorithms.		

Exercise-1:

a. Write a program to implement Transpose of a given matrix.

b. Write a program to implement Matrix multiplication.

Exercise-2:

a. Write a program to implement Stack operations using arrays.

b. Write a program to convert Infix expression into Postfix expression

Exercise- 3:

a. Write a program to implement Queue operations using arrays.

b. Write a program to implement Circular Queue operations using arrays

Exercise-4:

Write a programto implement the tree traversal methods.

Exercise-5:

Write a program for Binary Search Tree to implement the following operations.

i) Insertion ii) Deletion

Exercise-6:

a) Write a programto implement Breadth First Search.

b) Write a programto implement Depth First Search.

Exercise-7:

Write a program to implement Linear and Binary search using switch case.

Exercise-8:

a. Write a program to implement Bubble Sort

b. Write a program to implement Insertion sort.

Exercise-9:

a. Write a program to implement Quick Sort

b. Write a program to implement Merge sort

Exercise-10:

Write a program to implement Heap sort.

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
II	MC21B201	Environmental Science	1	0	0	0	50	-	50

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the importance of environment and natural resources	6, 7	1, 2
CO2	To acquire the knowledge on various principles of eco- systems and their functions.	6, 7	1, 2
CO3	To gain the knowledge on various principles, threats, and conservation of biodiversity.	6, 7	1, 2
CO4	To understand the importance of national and international concern for protection of environment from various pollutants	6, 7	1, 2
CO5	To understand various social Issues related to Environment	6, 7	1, 2
CO6	To understand the impact of human population on the environment.	6, 7	1, 2

MODULE - I

Environmental studies–Introduction: - Definition, scope and importance, Measuring and defining environmental development indicators.

Environmental and Natural Resources: Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, case studies - Timber extraction, dams- benefits and problems.

MODULE - II

Basic Principles of Ecosystems Functioning: Concept of an ecosystem. -Structure and function of an ecosystem. - Producers, consumers, and decomposers. - Energy flow in the ecosystem Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure, and function of the following ecosystem:

a) Forest Ecosystem
b) Grassland Ecosystem
c) Desert Ecosystem
d) Aquatic Ecosystem (Ponds, Streams, Lakes, Rivers, Oceans, Eustuaries)

MODULE - III

Biodiversity and its conservation: Introduction – Definition- genetic, species and ecosystem diversity. Bio-geographical classification of India

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India.

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

MODULE - IV

Environmental Pollution: Definition, Cause, effects and control measures of

a) Air pollution
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards

MODULE - V

Social Issues and the Environment: From unsustainable to sustainable development -Urban problems related to energy -Water conservation, rainwater harvesting, and watershed management - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, and holocaust. Case Studies. – Waste land reclamation

MODULE - VI

Human Population and the Environment: Population growth, variation among nations. Population explosion Role of information Technology in Environment and human health. - Case Studies.

Field work: Visit to a local area to document environmental assets River /forest grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. - Study of simple ecosystems- pond, river, hill slopes, etc.

Textbooks:

1. ErachBharucha, A Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission.

2. Perspectives in environmental Studies, AnubhaKaushik and C P Kaushik, New Age International Publishers, New Delhi, 2018. 2. A Textbook of Environmental Studies, ShashiChawla, McGraw Hill Education, New Delhi, 2017.

Reference Books:

1. Environmental Studies by Benny Joseph, McGraw Hill Education, New Delhi, 2017.

2. Fundamentals of environmental studies, MahuaBasu and S Xavier, Cambridge University Press, New Delhi, 2017.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER III

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1	GD21B3C1	UX & UI Design	3	2	0	5	4	50	50	100	W
2	GD21B3C2	Colour Theory	3	2	0	5	4	50	50	100	W
3	GD21B3C3	Python Programming	3	2	0	5	4	50	50	100	W
4	GD21B3C4	Cyber Laws	4	0	0	4	4	50	50	100	W
Laboratories/Studios/Practical											
5	GD21B3P1	Creative Writing and Designing Lab	1	0	4	5	5	50	50	100	P
6	GD21B3P2	Python Programming Lab	0	1	4	5	5	50	50	100	P
Ability Enhancement Course											
7	GD21B3K1	Critical & Creative Thinking	2	0	0	2	2	50	50	100	W
Open Elective											
8	GD21B3O1	Open Elective	2	0	0	2	2	50	50	100	W
Mandatory Course											
9	MC21B301	Indian Constitution	1	0	0	1		50	-	50	-
		Total	**19**	**7**	**8**	**34**	**30**				

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3C1	UX &UI Design	4	0	0	4	50	50	100

Cos	Course outcomes	POs	BTLs
	The student will be able		
CO1	To understand UX design, complexity, and perception.	1,2,4	1,2
CO2	To know about scope and different levels of UX design.	2,3,4	2,3,6
CO3	To learn user interface design process, elements, and user experience design principles.	2,3,4	1,2,3
CO4	To apply framework of design thinking to design process.	3,4	2,3,6
CO5	To know about principles of creating good interface.	3,4	2,4,6
CO6	To work with different navigation schemes and menus.	2,3,4	2,6

MODULE-I:

Introduction: A Brief introduction to User Experience (UX)Design, Complexity, and perception of User Experience (UX) design, Definition of User Experience (UX), What is Design? What is Design thinking? Who is a User?

History of UX design: History of UX design, The Scope of User Experience (UX), The Single interaction Level, The Journey Level, The Relationship Level, Importance of User Experience (UX).

MODULE-II:

User Interface (UI) Design: User Interface Design, UI Design Considerations, Design Process, Elements of Interface Design.

D**esign principles**: User Experience Design Principles (UX), Developing User Experience (UX) Design, Wireframe and its importance, Examples of wireframes, Wire framing process, Wire framing tools.

MODULE -III:

Design Thinking: Introduction to Design Thinking, Origin Design Thinking, what is Design Thinking? The Design Thinking process, what are the Principles of Design Thinking? Application of the Design Thinking Framework, Examples of design thinking success.

MODULE -IV:

Principles of good interface and screen design: Human considerations in Interface and Screen Design, The Test for a Good Design, Organizing Elements clearly and meaningfully, Visually Pleasing Composition, Focus and Emphasis.

MODULE -V:
Develop system menus and navigation schemes Structures of Menus, Functions of Menus, Content of Menus, Formatting of Menus, Phrasing the Menu, Selecting Menu Choices, Kinds of Graphical Menus
MODULE -VI:
Graphics, icons, and images: Icons, Influences on Icon Usability, Choosing Icons, Choosing Icon Images, Creating Icon Images, Icon Animation and Audition, The Icon Design Process, Multimedia, Graphics.

Textbooks:

1. UX and UI: A Step-by-Step Guide on UX and UI Design, by PAMALA B. DEACON.

2. The Essential Guide to User Interface Design by Wilbert O. Galitz.

3. A Project guide to UX Design, Russ Unger and Carolyn Chandler, Second Edition.

References:

1. Learn UX: Applying Lean Principles to Improve User Experience by Jeff

2. The Elements of User Experience: User-centred Design for the Web by Jesse James Garette

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3C2	Color theory	4	0	0	4	50	50	100

COs	Course outcomes	POs	BTLs
	The student will be able		
CO1	To know importance of drawing, painting, colouring in art	3,4,6	1,2
CO2	To learn vocabulary of colours and different types of colors.	3,4	2,3
CO3	To study about different coloured materials and their mixture.	3,4	2,3
CO4	To understand meaning and symbolism of colors.	3,4	2,3
CO5	To know about different light effects, colouring wheel, and their importance.	3,4	2,3
CO6	To learn about color models, color theory and applications regarding nature.	1,2,3,4	2,3,6

MODULE I:

Introduction: **The importance of color**: Drawing, Color, Painting and Brain Processes, Seeing Colors as Values, Why Values are Important, The Role of Language in Color and Painting, Understanding and Applying Color Theory, Theories about Color, Applying Color theory in Art.

MODULE II:

Learning the vocabulary of color: Learning the Vocabulary of Color, The Three Primary Colors, The Three Secondary Colors, the SixTertiary Colors, Analogous Colors, Complementary Colors.

Colored Materials: Pigments and Dyes, Opaque Materials, Transparent Materials, Fluorescent Materials, Metamerism andMatching Colors, Additive Color Mixture, Subtractive Color Mixture.

MODULE III:

Naming colors: The L-mode Role in Mixing Colors, The Three Attributes of Color, From Naming to Mixing, The Meaning and Symbolism of Colors, Attaching Names to Colors, Using Colors to Express Meaning,The Symbolic Meaning of Colors.

MODULE IV:

Color wheel: Using the Color wheel to understand Hue**,** Mixing Colors, Creating Colors, Using Color Wheel to Understand Value, how to use Value Wheel / Hue Scanner, How to Lighten and Darken Colors, Using the Color Wheel to understand Intensity.

MODULE V:

Effects of light Seeing the effects of Light, Color Constancy and Simultaneous Contrast, why it is Difficult to see the Effects of Light, How to Accurately Perceive Colors affected by Light, three different Methodsof Scanning a Hue

MODULE VI:

Beauty of color in nature: Seeing the Beauty of Color in Nature, Color Harmony in Flowers, Floral Painting in Art, Colors inNature Differ from Colors of Human-made Objects.

Color Models: RGB color model, CMYK Color model, RYB Color model, Overview of the historical progressionof Color Theory, An Example of Color Theory Application.

TEXTBOOKS:

1. Color Theory, An Essential guide to Color- from basic principles to practical application, PATTI MOLLICA

2. Applying Color Theory to Digital Media and Visualization By THERESA-MARIE RHYNE.

3. Color -A course in mastering the art of mixing colors by BETTY EDWARDS

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3C3	Python Programming	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the basics of Python	1,3,4	1,2,3
CO2	To Comprehend Types, Operators and Expressions	1,3,4	1,2,3
CO3	To Understand the Data Structures	1,2,3,4	2,3,4
CO4	To Understand the Functions.	2,3,4	2,3,4,5
CO5	To Develop Modules, python Packages and Object-Oriented Programming in OOP in Python	2,3,4	3,4,5,6
CO6	To understand Error and Exceptions, Brief Tour of the Standard Library	2,3,4	4,5,6

MODULE - I

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

MODULE - II

Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions, and order of evaluations Control Flow- if, if-else, for, while, break, continue, pass.

MODULE - III

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehension.

MODULE - IV

Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables

MODULE - V

Modules: Creating modules, import statement, from. Import statement, name spacing.
Python packages: Introduction to PIP, Installing Packages via PIP, Using Python Package.
Object Oriented Programming OOP in Python: Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding.

MODULE - VI

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.
Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

Textbooks:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W. Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3C4	Cyber Laws	4	0	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To Understand the Basics of Cyber Law Act	2,6,8	1, 2
CO2	To Understand Information Technology and Cyber Law and Related Legislation	2,6,8	1, 2,3
CO3	To Understand Cyber Crime	6,8	2,3,4
CO4	To Understand Electronic Business and Legal issues	6,8,10	1,2,3,4
CO5	To Understand the Cyber Ethics and Protection of Cyber Customers	6,8	2,4,
CO6	To Recommendations for Secured Society	8	2,4

MODULE – I

Introduction to Cyber law:
Evolution of computer Technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Cyber Ethics, Cyber Jurisdiction, Cyberspace- Web space, Web hosting and web Development agreement.

MODULE – II

Information Technology Act:
Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Certifying Authorities, Cyber Crime and Offences, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.
Cyber law and Related Legislation:
Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base, and its Protection

MODULE – III

Cyber Crime:
Unauthorized access, Email-bombing, Data diddling, Salami attack, Internet time theft, Logic bomb, Virus/ worm attack, Trojan attack, Denial of service attack, Distributed denial of Service attack, Email spoofing, Intellectual Property Crime.

MODULE – IV

Electronic Business and legal issues:
Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.

MODULE – V

Cyber Ethics:
The Importance of Cyber Law, Significance of cyber-Ethics, Need for Cyber regulations, and Ethics. Ethics in Information society.

Protection of Cyber Consumers:
Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India.

MODULE – VI

Recommendations for a Secure Society, Biometrics, Suggestions for better security, E-Security Tips, Data Protection Act-its need in India, Data Retention Policies.

Textbooks:

1. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher.
2. Cyber Ethics 4.0, Christoph Stuckelberger, Pavan Duggal, by Globethic.

Reference Books:

1. Cyber Law Simplified by Vivek Sood, New Delhi
2. Cyber Law A view to Social Security
3. Information Security policy & Implementation Issues, NIIT, PHI
4. Cyber Law, Jonthan Rosenoer, Springer, New York, (1997).
5. The Information Technology Act, 2005: A Handbook, OUP Sudhir Naib, New York, (2011)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3P1	Creative Writing and Designing Lab	1	0	4	5	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To familiarize the student with basic principles and fundamentals in visual art and design.	3,5	1, 2
CO2	To develop basic skills using tools and theory used in design process	3,5	1, 2
CO3	To understand the creative process, develop techniques and methods of creative problem solving	3,5	1, 2
CO4	To Understand the Photography basics and sourcing images, illustrator, Animate and After Effects	3,5	1, 2
CO5	To understand the fundamentals of web Design technologies such as layout design, page design, Cascading style sheet, Web Standards, Validation.	3,5	1, 2
CO6	To gain knowledge on Commercial Applications as Logo design, Web Design, Editorial Design.	3,5	1, 2

MODULE - I

What is Creativity?

Define Creativity, Measuring creativity, Inspiration and Agency, Creativity and Resistance, Art and Propaganda, Creativity and Madaness.

What is Creative Writing?

What is Creative Writing, Imagination and Writing, Restrictions of Open Field, Can Creative Writing be Taught? The Importance of Reading

MODULE - II

The Art and Craft of Writing

Tropes and Figures, Style and Register, Formal and Informal Usage, Varieties of English, Language and Gender, Disordered Language. Playing with Words, Grammar and Word Order, Tense and Time, Grammatical Differences.

MODULE - III

Fundamentals of Typography

Typography and meaning, the anatomy of type, understanding and selecting typefaces, spacing, readability and legibility, Typographic emphasis and hierarchy, Typographic rules/boxes and ornaments, text as image.

MODULE - IV

Tools and Technologies

Photography basics and sourcing images, page-assembly programs, illustrator, Animate and After Effects

MODULE - V
Web Design Basics Visual design and coding, The Languages and the Internet, The Building blocks of a web page, The graphical user interface, CSS, Web Standards, Validation, Designing for different browsers and platforms, Web design software, Web-based self-publishing.
MODULE - VI
Commercial Applications Core/Specialist skills, Logo Design and brand identity, Motion graphics, Web design, Editorial Design, Game Design, Advertising, Information Design.

Text books:

1. Graphic Design School: The Principles and Practice of Graphic Design by By David Dabner, Sandra Stewart, AbbieVickress
2. Game Design School: a foundation course in principles and practice, by David Dabner, Sheena Calvert, Anoki Casey.
3. Creative Writing A Beginner's Manual by AnjanaNeiraDev, AnuradhaMarwah, Swati Pal

Reference Books:

1. Designing Brand Identity Publisher: Wiley,Alina Wheeler 2017
2. Logo Modernism TaschenGmbHJens Muller.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3P2	Python Programming Lab	0	1	4	5	50	50	100

To implement the basic concepts of python programming like math function, Strings, List, Tuple and Dictionary

1. To write a python program that takes in command line arguments as input and print the number of arguments.
2. To write a python program find the square root of a number (Newton's method)
3. To write a python program find the maximum of a list of numbers.
4. To write a python program to perform Matrix Multiplication.
5. To write a python program simulate bouncing ball in Pygame

To implement the programs using conditional and loop statements

1. To write a python program exponentiation (power of a number).
2. To write a python program to compute the GCD of two numbers.
3. To write a python program first n prime number

To implement file handling techniques.

1. To write a python program to find the most frequent words in a text file.

To implement searching, sorting, and merging algorithms.

1. To write a python program linear search.
2. To write a python program Binary search.
3. To write a python program selection sort.
4. To write a python program Insertion sort.
5. To write a python program merge sort.

To implement concepts of OOPS.

1. To demonstrate working of classes and objects
2. To demonstrate constructors
3. To demonstrate class method and static method
4. Concept of polymorphism in python (method overloading and overriding)
5. To demonstrate inheritance

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
III	GD21B3K1	Critical and Creative Thinking	2	0	0	2	50	-	50

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand the Essential Critical Thinking Concepts	2,3,4	
CO2	Understand the Essential Creative Thinking Concepts	2,3,4	
CO3	Analyze for becoming a Critical Thinker	2,3,4	
CO4	Analyse for becoming a Creative Thinker	2,3,4	
CO5	Understand the Critical Thinking strategies and Applications	2,3,4	
CO6	To Learn various Definitions	2,3,4	

MODULE – I

Essential Critical Thinking Concepts:
What is Critical Thinking? Habits of Mind, Why Intellectual Habits and Character Matter, Overcoming Obstacles to Thinking, A Model of Critical Thinking, how you know What you Know, Perception and Knowledge, Being Wrong, Why Errors Persist, Applications.

MODULE – II

Essential Creative Thinking Concepts:
What is Creative Thinking? Seeking Alternatives and Possibilities, Reversing Relationships, Cross fertilizing, Shifting Attention, Denying the Negative, The Creative Habit, Creative Confidence, Creative Theft, Creative Crime, Creative Questions, Applications.

MODULE – III

Becoming a Critical Thinker:
Becoming a Critical Thinker, Intellectual Standards as Guidelines for Critical Thinking, Language and Thought, Reports, Inferences and Judgments, The Prevalence and Power of Metaphor, Innovating through Analogy.

MODULE – IV

Becoming a Creative Thinker:
Becoming a Creative Thinker, Developing the Creative Habit, Focus, Solo and Group Creativity, Concepts as Cognitive Tools

MODULE – V
Critical Thinking Strategies and Applications: The Nature of Argument, Claims, Evidence and Assumptions, Evidence: Claims and Warrants, Inductive and Deductive Reasoning. Imagination First, Imagination, Creativity, and Innovation, The Limits of Imagination, Capacities for Imaginative Thinking, Why Ideas Are Important, How to Get Ideas, Creative Whacks 147
MODULE – VI
Definitions: Reportive Definition, Stipulative Definition, Precising Definition, Criteria for Good Definitions, Definition Techniques, Three Misconceptions about Definitions. Making Decisions, Affective Forecasting, Achieving Insights that Affect Decisions, Institutional Decisions, Incentives and Decisions, Decisiveness, Making Tough Decisions, Making Group Decisions, Applications

Textbooks:

1. **Critical and Creative Thinking: A Brief Guide for Teachers by Robert Di Yanni**

2. An Introduction to Critical Thinking and Creativity: Think More, Think Better By Joe. Y. F. Lau

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
III	MC21B301	Indian Constitution	1	0	0	0	-	-	-

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	to Know the background of the present constitution of India.	6, 7	1, 2
CO2	to Understand the working of the union, state and local levels.	6, 7	1, 2
CO3	to Gain consciousness on the fundamental rights and duties.	6, 7	1, 2
CO4	to understand the functioning and distribution of financial resources between the centre and states.	6, 7	1, 2
CO5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.	6, 7	1, 2
CO6	To understand the international relations of India with the surrounding countries	6, 7	1, 2

MODULE - I

Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution.

MODULE - II

Union Government: Executive-President, Prime Minister, Council of Minister
State Government: Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government

MODULE - III

Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties

MODULE - IV

Relation between Federal and Provincial units: Union-State relations, Administrative, legislative, and Financial, Inter State council, NITI Ayog, Finance Commission of India

MODULE - V

Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women

MODULE - VI
India's External Relations: Cold War and Post-Cold War era.What is Foreign Policy? Basic Determinates of Foreign Policy Indian and its Neighbours India's Extended Neighbourhood in West Asia and Southeast Asia. India's relations with the United States and Russia. India and the World Organisations India in the 21st century

Reference Books:

1. D.D. Basu, Introduction to the constitution of India, Lexis Nexis, New Delhi

2. Subhash Kashyap, Our Parliament, National Book Trust, New Delhi

3. Peu Ghosh, Indian Government &Politics, Prentice Hall of India, New Delhi

4. B.Z. Fadia & Kuldeep Fadia, Indian Government &Politics, Lexis Nexis, New Delhi

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER IV

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1.	GD21B4C1	Animation, Materials and Shaders	3	2	0	5	4	50	50	100	W
2.	GD21B4C2	Digital Image Processing	3	0	0	3	3	50	50	100	W
3.	GD21B4C3	Game Engine Architecture	3	1	0	4	3	50	50	100	W
4.	GD21B4C4	Operating Systems	4	0	0	4	4	50	50	100	W
5.	GD21B4C5	Java Programming	3	0	0	3	3	50	50	100	W
6.	GD21B4C6	Game Analysis	3	1	0	4	3	50	50	100	W
Laboratories/Studios/Practical											
7.	GD21B4P1	Image Editing using Photoshop Lab	0	0	4	4	4	50	50	100	P
8.	GD21B4P2	Java Programming Lab	0	0	4	4	4	50	50	100	P
Open Elective											
9.	GD21B4O1	Open Elective	2	0	0	2	2	100	-	100	-
Mandatory Course											
10.	MC21B401	Essence of Indian Traditional Knowledge	1	0	0	1	0	-	-	-	-
Total			**22**	**4**	**8**	**34**	**30**				

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4C1	Animation materials & shaders	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the fundamentals of 3D animation basics methods and techniques of Animation Technology	4,5	1, 2
CO2	To acquire the knowledge on production pipelines components and working skills needed for becoming an effective Animator.	4, 5	1, 2
CO3	To gain the knowledge on story telling principles and pre-visualization Techniques	4,5	1, 2
CO4	To understand the work flows of character/ Environment modelling and Texturing	4, 5	1, 2
CO5	To understand the work flows of character Rendering and Lighting Techniques	4,5	1, 2
CO6	To gain knowledge on f Traditional animation to make use of traditional& digital tools to produce stills and moving images.	4,5	1, 2

MODULE - I

3D Animation Overview

Defining 3D Animation, Exploring the 3D Animation Industry, Entertainment, Scientific, The History of 3D Animation.

MODULE – II

Getting to Know the Production Pipeline

Understanding the Production Pipeline's Components , Working in 3D Animation Preproduction , Idea/Story , Script/, Storyboard , Animatic/Pre-visualization , Design ,Working in 3D Animation Production, Layout , Research and Development ,Modeling , Texturing , Animation ,3D Visual Effects , Lighting/Rendering

MODULE - III

Story, and Pre-visualization

Building a Good Story, Story Arc, Character, Goal, and Conflict, The Hero's Journey, Other Storytelling Principles , Using Pre-visualization Techniques , Basic Shot Framing , Camera Movements , Editing.

MODULE - IV

Understanding Modeling and Texturing Modeling, Polygons, NURBS, Subdivision Surfaces, Modeling Workflows, Texturing, UVs, Shaders, Texture Maps , Texturing Workflows
MODULE - V
Lighting, and Rendering Lighting, Light Types, Light Attributes, Lighting Techniques, The Basic Lighting Workflow, Rendering , Basic Rendering Methods , Global Illumination, Advanced Shader Functions ,The Basic Rendering Workflow.
MODULE - VI
Exploring Animation, Using Principles of Fine Art and Traditional Animation, Modeling ,Texturing/Lighting , Character Animation , VFX

Text books:

1. 3D Animation Essentials Andy Beane.

Reference

1. 3D animation techniques, you can get demo versions of 3D animation software from various software companies, including the following:

2. Autodesk Maya, 3ds Max, Softimage, Mud box, and Motion Builder at http://usa.autodesk.com/ and http://students.autodesk.com/

3. Blender at www.blender.org

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4C2	Digital Image Processing	4	0	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To Understand image representation and will Enhance image transforms.	2,3,4	2,4
CO2	To Filter given image using frequency domain filtering technique and spatial domain filtering technique.	2.3,4	1,2
CO3	To Select the right image restoration technique to remove degradation from given image	2,4	2,3
CO4	To Represent image using minimum number of bits using image compression	2,4	2,3
CO5	To Understand image segmentation technique	2,4	1,2
CO6	To do morphological operations on given image	2,4	1,2

MODULE - I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels.
Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform

MODULE - II

Image enhancement and filtering in spatial domain:
Intensity transformation functions: Contrast stretching, Thresholding, Image negative, Log transformation, Power-low transformation, Intensity level slicing and Bit-plane slicing. Image histogram, Histogram equalisation process. Fundamentals of spatial filtering, Correlation and convolution.
Image filtering in the frequency domain:
Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering, 2D- DFT, 2DFFT, 2D- DCT, Fundamentals of 2D-wavelet transform, Image pyramids, sub-band coding.

MODULE - III

Image restoration: Reasons for image degradation, Model of image degradation/restoration process, Noise probability density functions, Image restoration using spatial filtering (Mean filters, Order statistic filters and adaptive filters), Inverse Filtering, MMSE (Wiener) Filtering.
Colour Image Processing: Cooler Fundamentals, Colour Models, Pseudo-colour image processing.

MODULE - IV
Image Compression: Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard, Wavelet based image compression.
MODULE - V
Image Segmentation: Edge based segmentation, Region based segmentation, Region split and merge techniques, Region growing by pixel aggregation, optimal thresholding.
MODULE - VI
Morphological Image Processing: Basic morphological operations, Erosion, dilation, opening, closing, Structuring elements, Hit-or-Miss transform, Basic Morphological Algorithms: hole filling, connected components, thinning, skeletons, Reconstruction by erosion and dilation.

Textbook:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Third Edition, Pearson Education 2008.
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veera Kumar- TMH, 2010.

Reference Books:

1. Digital Image Processing, S Jayaraman, S Esakkirajan, T Veera Kumar, Tata McGraw Hill Publication
2. Digital Image Processing, S Sridhar, Oxford University Press.
3. Fundamentals of Digital Image Processing: A. K. Jain, PHI.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4C3	Game Engine Architecture	4	0	0	4	50	50	100

Cos	COURSE OUTCOMES	POs	BTLs
	The student will be able to		
CO1	Learn about Game engine basics and its tools	1,5	1,2
CO2	Study Fundamentals of Software Engineering concepts and concurrent programming	1,5	1,2
CO3	Learn 3D math for Games, to understand basics of vectors , matrices etc	1,5	1,2
CO4	Analyse what are the support systems for Game Engine	1,5	1,2
CO5	Learn about real time simulation and human interface devices	1,5	1,2
CO6	Learn different tools for debugging and development	1,5	1,2

MODULE –I

Introduction: Structure of a Typical Game Team, What Is a Game? What Is a Game Engine? Engine Differences across Genres, Game Engine Survey, Runtime Engine Architecture, Tools and the Asset Pipeline.

Tools of the Trade: Version Control, Compilers, Linkers and IDEs, Profiling Tools, Memory Leak and Corruption Detection, Other Tools

MODULE–II

Fundamentals of Software Engineering for Games :C++ Review and Best Practices, Catching and Handling Errors, Data, Code and Memory Layout, Computer Hardware Fundamentals, Memory Architectures.

Parallelism and Concurrent Programming: Defining Concurrency and Parallelism, Implicit Parallelism, Explicit Parallelism, Operating System Fundamentals, Introduction to Concurrent Programming, Thread Synchronization Primitives, Problems with Lock-Based Concurrency, Some Rules of Thumb for Concurrency, Lock-Free Concurrency, SIMD/Vector Processing, Introduction to GPGPU Programming

MODULE–III

3D Math for Games: Solving 3D Problems in 2D, Points and Vectors, Matrices, Quaternion's, Comparison of Rotational Representations, Other Useful Mathematical Objects, Random Number Generation

MODULE–IV

Engine Support Systems: Subsystem Start-Up and Shut-Down, Memory Management, Containers, Strings, Engine Configuration **Resources and the File System:** File System, The Resource Manager.
MODULE–V
The Game Loop and Real-Time Simulation: The Rendering Loop, The Game Loop, Game Loop Architectural Styles, Abstract Timelines, Measuring and Dealing with Time, Multiprocessor Game Loops **Human Interface Devices:** Types of Human Interface Devices, Interfacing with a HID, Types of Inputs, Types of Outputs, Game Engine HID Systems, Human Interface Devices in Practice
MODULE-VI
Tools for Debugging and Development: Logging and Tracing, Debug Drawing Facilities, In-Game Menus, In-Game Console, Debug Cameras and Pausing the Game, Cheats, Screenshots and Movie Capture, In-Game Profiling, In-Game Memory Stats and Leak Detection

TEXTBOOK:

1. Game Engine Architecture, Third Edition by Jason Gregory

REFERENCES:

1. Game Engine Architecture, Second Edition by Jason Gregory

2. 3D game engine architecture by David H. Eberly

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4C4	Operating System	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Understand the basic concepts related to the operating systems.	1,2,10	1,2
CO2	Analyze the various process scheduling algorithms and process synchronization mechanisms.	1,2,3,4, 8,10	1,2
CO3	Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.	2,8,9,10	1,2
CO4	Analyze the various input/output Systems	1,2,3,4, 5,6,7,8, 9	1,2
CO5	Understand the ways to deal the deadlocks and the basic concepts related to files in the system.	2,8,6	1,2
CO6	analyze the protection and security mechanisms	2,10	1,2

MODULE – I

Operating Systems Basics: Operating systems functions, Overview of computer operating systems, distributed systems, operating system services and systems calls, system programs, operating system structure.

MODULE – II

Process Management: Process concepts, scheduling-criteria, algorithms, their evaluation.

Concurrency: Process synchronization, the critical-section problem, Peterson‘s Solution, semaphores, classic problems of synchronization, monitors.

MODULE – III

I/O Systems: Principles **of I/O Hardware**: I/O devices, Device controllers ,Direct memory access.

Principles of I/O Software : Goals , Interrupt handlers , Device drivers , Device independent I/O software **Secondary-Storage Structure** : Disk structure, Disk scheduling, Disk management , Swap-space management , Disk reliability ,Stable storage implementation .

MODULE – IV

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement, algorithms, Allocation of frames..
MODULE – V
Deadlocks: system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form Deadlock. **Files**: The concept of a file, Access Methods, Directory structure, File system mounting, File sharing, protection
MODULE – VI
Protection: Protection, Goals of Protection, Principles of Protection, Domain of protection Access Matrix, Implementation of Access Matrix. **Security**: The Security problem, program threats, user authentication.

Text Books:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Eighth edition, John Wiley.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education

2. William Stallings, "Operating Systems: Internals and Design Principles", Sixth Edition2009, Pearson Education.
3. D.M.Dhamdhere, "Operating Systems, A Concept based Approach", Third Edition, TMH
4. A.S.Godbole, "Operating Systems", Second Edition, TMH.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4C5	Java Programming	4	0	0	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	To understand object-oriented programming concepts of java.	3,4	1, 2
CO2	Apply the concept of inheritance, polymorphism and Packages, Interfaces	3,4	1, 2,3
CO3	Implement Exception handling and able to develop multithreaded applications with synchronization.	3,4	1, 2,3,4
CO4	Develop an object-oriented program handling data file and multi-threading Programming	3,4	1, 23,4
CO5	Able to develop applets for web applications.	3,4	2,3,4,5
CO6	Able to design GUI based applications	3,4	2.3.4.5

MODULE – I

Object Oriented Programming basics: Need for OOP paradigm, Principles of OOP concepts. Java Basics: History of Java, Java buzzwords, Simple java program, classes and objects – concepts of classes, objects, constructors, methods, Introducing access control, this keyword, overloading methods and constructors.

MODULE – II

Inheritance: Inheritance basics, Types of Inheritance, benefits of inheritance, super uses, using final with inheritance, polymorphism- method overriding, abstract classes.

Packages and Interfaces: Defining, Creating and Accessing a Package, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

MODULE – III

Exception handling and multithreading: Concepts of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads.

MODULE – IV

Event Handling : Events, Event sources, Event classes, Event Listeners, Delegation event model, handling Mouse and Keyboard events, Adapter classes, The AWT class hierarchy, user interface components- Labels, Button, Scrollbars, Text Components, Check box, Choices, Graphics, Layout manager types – Flow, Border, Grid, Card and

Grid bag.
MODULE – V
Applets: Concepts of Applets, differences between applets and applications, life cycle of an Applet, creating applets, passing parameters to applets.
MODULE – VI
Swings: Introduction, JApplet, JFrame and JComponent, Icons and Labels, text fields, JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, and Tables.

TextBooks:

1. Java;the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

Reference Books:

1. An Introduction to programming and OO design using Java, J.Nino and F.A.Hosch, Johnwiley & sons.

2. An introduction to Java programming and object oriented application development, R.A.Johnson-Thomson.

3. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition,Pearson Education.

4. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition,Pearson Education.

5. ObjectOriented Programming through Java, P. Radha Krishna, University Press.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4C6	Game Analysis	3	1	0	3	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand what are the building blocks and areas of study for Game Analysis	2,4	2, 3
CO2	Learn how to play a game critically through walkthroughs and cheats.	2,4	2, 3
CO3	Analyse the building blocks, game genre, various context	2,4	2, 3,4
CO4	Understand Game overview, Game Mechanics, Game Modes etc.	2,4	2, 3,4
CO5	Learn what are the formal elements to analyse a Game, Game dynamics	2,4	2, 3,4
CO6	Learn types of analysis, how to write the analysis, Game summary	2,4,10	2, 3

MODULE – I

Introduction: How are Games Texts?, What is Textual Analysis?, Game Analysis for All, Textbox: The Problems with Canons, The Building Blocks and areas of study of Game Analysis, Context, Game Overview, Formal Aspects, Defining the Area of study and our Audience.

MODULE – II

Preparing for the Analysis: Introduction, Your Analysis is as Good as Your Sources, Playing the Game Critically, What Does Finished Mean, Interactivity and Critical Distance, Walkthroughs and Cheats, Gathering Information about the Game, Overview of Possible Resources, Game Review, Postmortems, Secondary Sources, Player Data, The Problem with Spoilers, The Readiness is All.

MODULE – III

Areas of Analysis-1:Context - Introduction, Context Helps Understand the Game, What Counts as Context, The Building Blocks, Inside the Game, Production Team, Game Genre, Technological Context, Socio-Historical Context, Economic Context, Audience, Relations to Other Media.

MODULE – IV

Area of Analysis-2: Game Overview – Introduction, Game Overview: Building Blocks, Number of Players, Multiple Players Vs Game, Multilateral Competition, Cooperative play, Rules and Goals of Game/ Game Modes, Game Mechanics, Spaces of the Game, Fictional World of the Game, Story, Gameplay Exercises, Game Communities

MODULE – V

Area of Analysis-3:Formal Elements – Introduction, Formal Elements: Building Blocks, Rules of the world, Diegetic Vs. Extradiegetic Rules, Save Games, Relationship between rules and the Fictional World, Abstraction, Values and Procdural Rhetoric, Procedural content Vs Hard-Coded Content, Game Dynamics,

Control Schemes and Peripherals, Difficulty levels/Game Balance.
MODULE – VI
Writing the Analysis: Introduction, Types of Analysis: Overview, Game Summary: The Key Section, Journalistic Review, Historical analysis, Game Communities, Quantitative Vs. Qualitative, The Issue with Virtual Worlds, Illustration of a theory.

Textbook:

1. Introduction to Game Analysis , 2nd Edition, Clara Fernandex-vara

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

1. SEMSTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4P1	Image Editing using Photoshop Lab	0	0	4	4	50	50	100

COs	Course outcomes	POs	BTLs
	The student will be able		
CO1	To understand basics of photoshop and how to use photoshop.	1,2	
CO2	To work with different tool boxes and will be able to design user interface.	2,4	
CO3	To learn different types of images and their operations in different formats.	1,2	
CO4	To understand flash file formats, user interface and tools.	1,2	
CO5	To know about simple image drawings, colours and art work.	1,2	
CO6	To work with filters, frames& layers, and animation art.	1,2,4	

Exercise 1 : CREATING PHOTOSHOP FILE

Exercise 2 : Correcting Backlight

Exercise 3 : Brightening Specific Spot

Exercise 4 : Mixed Black and White with Colors

Exercise 5 : Enhancing Portraits – Removing Red Eye

Exercise 6 : Removing Facial Blemishes/Mole

Exercise 7 : Removing White Background on Logo and Turn into Transparent Image

Exercise 8 : Cropping an Object

Exercise 9 : Clean Background

Exercise 10 : Bokeh Effect / Blur Background

Exercise 11 : Zooming Effect In Picture

Exercise 12 : Watermark Using Actions

Exercise 13 : Panorama

Exercise 14 : Mass Image Editing Using Photoshop Actions

Exercise 15 : Download font at www.1001freefonts.com

Exercise 16 : Text Effects

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
IV	GD21B4P2	Java Programming Lab	0	0	4	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Create, compile, and run Java programs		
CO2	Apply the concept of inheritance and polymorphism		
CO3	Implement Packages, Interfaces and Exception handling		
CO4	Develop windows applications both for standalone and Applets programs by using awt and swings.		

Exercise-1:

a) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.

b) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer. (useScanner class to read input)

Exercise-2:

a) Write a Java program to multiply two given matrices.

b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)

c) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

Exercise- 3:

a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

Exercise-4:

a) Write a JAVA program to implement constructor overloading.

b) Write a JAVA program implement method overloading.

Exercise-5:

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement multi level Inheritance

c) Write a java program for abstract class to find areas of different shapes

Exercise-6:

a) Write a JAVA program give example for "super" keyword.

b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise-7:

a) Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)

b) Write a Java program to implement packages.

Exercise-8:

a) Write a JAVA program that describes exception handling mechanism

b) Write a JAVA program that implements Runtime polymorphism

Exercise-9:

a) Write a JAVA program to display analog clock using Applet.

b) Write a JAVA program to create different shapes and fill colors using Applet.

c) Write a Java program to develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

Exercise-10:

a) Write a Java program for handling mouse events.

b) Write a Java program for handling keyboard events.

Exercise-11:

a) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. (Real Time)

b) Write a JAVA program that to create a single ball bouncing inside a JPanel.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER-V

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1.	GD21B5C1	Game Idea Visualization and Story Telling	3	1	0	4	3	50	50	100	W
2.	GD21B5C2	Sound Design	3	1	0	4	3	50	50	100	W
3.	GD21B5C3	C# Programming	3	2	0	5	4	50	50	100	W
4.	GD21B5C4	Unity -I	4	0	0	4	4	50	50	100	W
5.	**Elective-I**		3	2	0	5	4	50	50	100	W
Laboratories/Studios/Practical											
6.	GD21B5P1	Unity – I Lab	0	0	4	4	4	50	50	100	P
7.	GD21B5P2	C# Programming Lab	0	0	4	4	4	50	50	100	P
Ability Enhancement Course											
8.	GD21B5K1	Entrepreneurial Skills	2	0	0	2	2	50	50	100	W
Open Elective											
9.	GD21B5O1	Open Elective	2	0	0	2	2	100	-	100	-
Total			**20**	**6**	**8**	**34**	**30**				

Elective –I

S.No	Course Code	Course Title
1	GD21B5E1	Artificial Intelligence
2	GD21B5E2	Computer Networks
3	GD21B5E3	Mobile Computing

* Note: W- Written, P- Practical

(All Practical semester end exams will be followed by Viva- Voce)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5C1	Game Idea: Visualization & Story telling	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the characters in games, films, and television	3,4,5	2,3,6
CO2	To understand the characterization of games	3,4,5	3,4,6
CO3	To carry Empathy and emotion	3,4,5	3,4,6
CO4	To Classify conflict and Story arc	3,4,5	2,3,6
CO5	To understand game conflict	3,4,5	1,3,6
CO6	To understand plotting and sub plotting	3,4,5	3,6

MODULE – I

Classic characterization:
classic characters in games, films, television & literature
what is character in game space? what is motivation in game space? back-story? how do these impact the creation of game characters**?**

MODULE - II

Characterization for games:

Player motivations vs. character motivations. Building character – mechanics vs. dramatics. Character types, character traits.

How to provide relevant and immersive fiction to existing game mechanics.

MODULE - III

Empathy and emotion:

Meaningful moments, identifying with characters, making choices that matter. The Three Act structure for games: Opening, Mid Game, End Game**.**

MODULE - IV

Classic conflict and Story arc

Developing conflict: collision, complication, and culmination.

The terminology of structure: exposition, point of attack, rising action, turning point, falling action, revelation, twist, and resolution.

How great game fiction inspires great game mechanics.
MODULE - V
Game conflict: Game objectives related to conflict and story structure. The quest, the journey, and the challenge
MODULE - VI
Plotting and sub plotting Classical vs. revolutionary screenplay structure. Dealing with coincidence in story plotting. The creation of drama and tension.Crucial moments in storytelling**.**

Textbooks:

1. Interactive Stories and Video Game Art: A Storytelling Framework for Game Design by chrissolarski.

Reference Books:

1. Visual Storytelling: How to Speak to the Audience Without Saying a Word by morgansandler.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5C2	Sound Design	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the basic concepts of sound.	1,3,4,	2,3
CO2	To understand the sound effects and mixing	3,4,5	3,4
CO3	To understand the surround and spatial sound	3,4,5	3,5
CO4	To understand the sound for story and challenges of game audio	2,3	2,5
CO5	To understand the concepts of sound design	3,4	6
CO6	To understand game design before starting	2,5	2

MODULE – I

Introduction to sound – What is sound, frequency, Consonance and Dissonance, Amplitude, Timbre, Wave Interference, Sound Envelopes, Smearing, Rhythm & Masking, Selecting Sounds: Sound libraries, Digital Sounds.

Recording Sounds- Audio Slating, Stereo or Mono Recording, Microphones & Microphones Selection, Recording Accessories, Microphone Position, Creative Recording, Prototyping Sounds

MODULE – II

Sound Effects- Tremolo & vibrato, Pitch Shifting & Auto Tune, Equalization, Filters, Modulation: Ring Modulation &Vocoder, Distortion: Overdrive & fuzz, Summary and Bonus Exercises.

Mixing- Mixing Theory: three-Dimensional Sound, A note on Mixing in Audacity, Dynamic Range, Compression, Limiting and Normalization, Expansion & gating, Ducking, Notice Reduction, Figure& Ground: Signal to noise.

MODULE – III

Surround And Spatial Sound- Human sound Localization, Binaural Audio, In-head Localization, Surround Sound, Ambisonics& object-based Audio, Spatial Sound, Sound propagation.

MODULE – IV

Sound For Story- Functional of sound in Audio Story, the mix, Audio Research, Audio Story Analysis, Spotting a Script, The Asset list **Challenges of Game Audio**- Implementation, Reputation and fatigue Avoidance, Interactive elements & prototyping, Environmental sound Design and Modeling, Mixing.
MODULE – V
Sound Design- The art of effectively Communications with sound, the Art of sound Design: A Brief History of sound Design, Sound Design- Basic Considerations- Effective sound Design and Sound Design guidelines, Getting the Right Tools- Equalization, Dynamic Range, Reverberation, Harmonic Processors, Metering Tools, Utilities, Microphones choice: Dynamic Vs Condensers.
MODULE – VI
Sound Design- Before you Start- Always use high Quality Material, Don't Get too Attached, Build and Learn, listen for the Expected and the Unexpected, layers, be organized, Communicate, Experiment.

Text books:

1. Studying sound: A Theory and practice of sound design eBook: Collins, Karen
2. Principles of Game Audio and Sound Design: Sound Design and audio implementation media - Jean- Luc Sinclair

Reference books:

1. The Game Audio Tutorial: A Practical Guide to Sound and Music for Interactive Games by Richard stevens.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5C3	C# PROGRAMMING	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand c# language syntax and overview of .net.	2,3,5	1, 2
CO2	Know the advanced features of c#.	2,3	1, 2
CO3	Demonstrate knowledge of object-oriented concepts of c#.	3,4	1, 2
CO4	Understand and implement string manipulation, events and exception handling within .NET application environment.	2,3,4	1, 2, 4
CO5	Create and manipulate GUI components in C#.	3,4	1, 2, 6
CO6	Design and Implement Windows Applications using Windows Forms, Control Library, Advanced UI Programming & Data Binding concepts, Design and Implement database connectivity using ADO.NET in window based application.	2,3,4	1, 2, 4, 6

MODULE – I:

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant.

MODULE – II:

LANGUAGE FEATURES C#: Arrays and tuples, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing, delegates, lambdas, lambda expressions, Events, Event publisher, Event listener, Memory management and pointers, reflection.

MODULE – III:

OBJECT ORIENTED ASPECTS OF C# : Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

MODULE – IV:

APPLICATION DEVELOPMENT ON .NET: Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, Dataset, typed dataset, Data Adapter, updating

database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.
MODULE – V:
WEB BASED APPLICATION DEVELOPMENT ON .NET: Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.
MODULE – VI:
CLR AND .NET FRAMEWORK : Assemblies, Versioning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshaling, remoting, security in .NET.

Text books:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012., 2010.

Reference Books:

1. Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5C4	UNITY-I	3	2	0	4	50	50	50

Cos	COURSE OUTCOMES	POs	BTLs
	The student will be able to		
CO1	Learn the basic Unity features relevant to 2D games and offer background Details about exporting and preparing 2D assets ready for importing into Unity.	1,5	1,2
CO2	Learn how to create Scenes, Game Objects, Components and Assets and also how to create textures with transparency.	1,5	1,2
CO3	Learn how to get up and running quickly in Unity for creating 2D games.	1,5	1,2
CO4	Learn how to do developmental work that we'll need to perform to achieve high quality and highly controllable results in our 2D games	1,5	1,2
CO5	Learn How to solve these issues in flexible ways that do not involve compromising our power as a developer or the quality of our game	1,5	1,2
CO6	Analyze How to achieve pixel- perfect 2D games and also Learn How to configure my scene	1,5	1,2

MODULE –I

Unity Basics for 2DGames:

Unity Projects, Assets, and Scenes, Project Wizard and Project Panel, Assets and Project Files Scenes Navigating Scenes and View ports, Game Objects, Transforms, and Components, Cameras, Meshes and Geometry, Scripting and the Unity API, Mono Develop, Components, Performance, Profiling.

MODULE–II

Materials and Textures:

Using Materials and Textures, Getting Started with Materials, Mesh Renderers, Shaders, Working with Textures, Materials for 2D Games, Use White Ambient Light, Use Light-Immune Shaders, Creating Textures, Power-2 Dimensions, Retain Quality, Expand Alpha Channels for Transparency

MODULE–III

Quick 2D Workflow

Getting Started at Making "2D Alien Invasion", Adding the Player and Enemies to the Scene, Implementing Player Movement, Implementing Player Weapons with Prefabs , Creating an Ammo Prefab Object, Implementing the Ammo Trajectory, Implementing Moving Enemies and Collision ,The Enemy Controller.cs Script ,Setting the Box Collider as a Trigger Volume

MODULE–IV
Customizing the Editor with Editor Classes, Editor Classes, Getting Started with Batch Rename , Batch Rename.cs,Creating a Folder for Editor Extensions ,Adding Batch Rename to the Application Menu, The Create Wizard Function, Testing the Batch Rename Menu Option, Reading Object Selections in the Scene
MODULE–V
Procedural Geometry and Textured Quads, Getting Started with the Create Quad Feature, Setting the Quad's Anchor Point, Specifying the Asset Path, Generating the Quad Mesh ,Create Vertices ,Create Quad as an Asset, Instantiate Quad in Scene, Testing the Quad Mesh Generator
MODULE-VI
Generating Atlas Textures, Getting Started with Atlas Textures, Configuring Texture Inputs, Atlas Textures and UVs, Generating an Atlas ,Optimizing Texture Inputs ,Generating an Atlas ,Atlas Generation Generating an Atlas , Savingthe Atlas Prefab, Testing the Atlas Texture

Textbook:

1. Learn Unity for 2D Game DevelopmentBy Alan Thorn ·

References:

1. **Unity Game Development in 24 Hours, Sams Teach Yourself by Mike Geig**

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5E1	Artificial Intelligence	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the basic concepts of Artificial intelligence and search strategies	1,5	1,3
CO2	To understand the advanced search	2,4	4
CO3	To understand the basic knowledge representation and reasoning and Advanced Knowledge Representation and Reasoning	4	4,5
CO4	To understand the reasoning under uncertainty	2,3	2
CO5	To understand the Learning and expert systems	2,4	2
CO6	To understand Constraint Satisfaction Problems and natural language processing	2,5	2,3

MODULE - I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents **Basic Search Strategies**: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

MODULE - II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning.

MODULE - III

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes

MODULE - IV

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

MODULE - V

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

MODULE - VI

Constraint Satisfaction Problems: Introduction, what is CSP? CSP as a search Problem, Local Search for Constraint Satisfaction Problem, Formulating Problem Structure.

Natural Language Processing: Introduction, Levels of NLP, Syntactic and Semantic Analysis, Discourse and Pragmatic Processing, Information Retrieval, Information Extraction, Machine Translation, NLP and its Application.

Textbooks:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-Hall, 2010.
2. Artificial Intelligence Building Intelligent Systems- ParagKulkarni, Prachi Joshi.

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5E2	Computer Networks	3	2	0	4	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the basic levels and its functions in computer networks	4,5	2
CO2	To understand the basics of how data flows from one node to another	5	2
CO3	Determine the functionality in Data link layer and MAC	4	5
CO4	Evaluate the performance of a network	2,3	5
CO5	To understand how to divide the packets and reassemble the packets.	2	2
CO6	Understand the working of various application layer protocols	4,5	2

MODULE – I

Introduction: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay**.** Addressing, Analog and digital signals.

MODULE – II

The Physical Layer: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system

MODULE – III

The Data Link Layer: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer on the internet.

The Medium access Layer: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, BluetoothTHE NETWORK LAYER: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer on the internet (IPv4 and IPv6), Quality of Service.

MODULE – IV

The Network Layer: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer on the internet (IPv4 and IPv6), Quality of Service.

MODULE – V

The Transport Layer: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

MODULE – VI
The Application Layer: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http. APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet

TEXT BOOKS:

1. Data Communications and Networking – Behrouz A. Forouzan , Fourth Edition TMH, 2006.
2. Computer Networks – Andrew S Tanenbaum, 4th Edition, Pearson Education**.**

REFERENCE BOOKS:

1. An Engineering Approach to computer Networks-S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and networks, 3rd Edition, W.A. Shay, Cengage Learning.
3. Computer and Communication Networks, Nader F. Mir, Pearson Education.
4. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose ,K.W.Ross , 3rd Edition , Pearson Education.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5E3	Mobile Computing	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand concepts of Mobile Communication.	1,2	2
CO2	To analyze next generation Mobile Communication System.	4	4
CO3	To understand network and transport layers of Mobile Communication.	4	2
CO4	To understand IP and TCP layers of Mobile Communication	1,3,4	2
CO5	Develop a mobile application using android/ iOS /windows SDK	3,4	6
CO6	Analyze various protocols of all layers for mobile and ad hoc wireless communication networks	4,5	4

MODULE - I

Introduction: Introduction to Mobile Computing — Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing — Spread spectrum -MAC Protocols — SDMA- TDMA- FDMA- CDMA**.** Security Concern regarding Mobile Computing, Different Propagation Modes, Wireless Architecture, and its types, needs of mobile user.

MODULE - II

Mobile Telecommunication System:

GSM: - Channel allocation, call routing Architecture, PLMN interface, addresses and identifiers, network aspects, frequency allocation, authentication and security, Handoffs Technique.

GPRS: network operation, data services, Applications, Billing, and charging.

MODULE - III

Mobile Network Layer:

Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, **AODV,** Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks **(VANET**) –MANET vs. VANET – Security.

MODULE - IV

Mobile Transport Layer:

Overview of Traditional TCP and implications of mobility control. Improvement of TCP: Indirect TCP, Snoop TCP, Mobile TCP, Fast Retransmit/fast recovery, Time-out freezing, Selective retransmission, Transaction-oriented TCP.

MODULE - V
Mobile Platforms and Applications: Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.
MODULE - VI
Mobile Ad Hoc wireless networks: Introduction, Benefits, Difference, Routing protocols for ad hoc wireless networks: DSDV and AODV **Introduction to 4G**: Introduction, features and challenges, Applications of 4G, 4G network architecture

Textbooks:

1. Jochen Schiller, "Mobile Communication", PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt.Ltd, New Delhi – 2012.

Reference Books:

1. Dharma PrakashAgarwal, Qing and An Zeng, "Introduction to wireless and Mobile systems", Thomson Asia Pvt Ltd,2005.
2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "principles of Mobile Computing", springer,2003.
3. William C.Y. Lee, "Mobile Cellular Telecommunication – Analog and Digital Systems", Second Edition, TataMcGraw Hill Edition, 2006.
4. C.K. Toth, "Adhoc Mobile Wireless Networks", First Edition, Pearson Education , 2002.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5P1	UNITY-I	0	0	4	4	50	50	50

Lab Exercises

1.Getting started with Unity

a) Working in unity
b) Unity basics
c) Downloading and installing unity
d) Deploying unity offline
e) Learning the interface

2.Asset over flow

a) Primitive and place holder objectives
b) Importing Assets
c) Import settings
d) Importing from the Assets store
e) Assets packages
f) Standard Assets

3.The Main window

a) The project window
b) The scene view
c) The game view
d) The Hierarchy window

4.The inspector window

a) Assigning icons
b) Editing properties
c) Preset Libraries
d) Inspector options
e) Toolbar
f) Searching
g) Other windows
h) Unity hotkeys
i) Customizing your workspace

5.Game objects

a) Introduction to components

b) Using components
c) Transform
d) Creating components with scripting
e) Deactivating Game objects
f) Static Game objects
g) Prefabs

6. Unity basics for 2D Games

a) Creating scenes
b) Creating Game play

7.2D over view

a) Game play in 2D
b) Sprites
c) Sprites creator
d) Sprites Editor

8.Physics Reference 2D

a) Physics 2D settings
b) Rigid body 2D

9.Collider 2D

a) Circle collider 2D
b) Box collider 2D
c) Polygon collider 2D
d) Edge collider 2D
e) Capsule collider 2D

10.Physics Material 2D

a) Physics Overview
b) Rigid Body overview
c) colliders

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5P2	C# PROGRAMMING LAB	4	0	3	6	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand c# language syntax and overview of .net.		
CO2	Know the advanced features of c#.		
CO3	Demonstrate knowledge of object-oriented concepts of c#.		
CO4	Understand and implement string manipulation, events and exception handling within .NET application environment.		
CO5	Create and manipulate GUI components in C#.		
CO6	Design and Implement Windows Applications using Windows Forms, Control Library, Advanced UI Programming & Data Binding concepts, Design and Implement database connectivity using ADO.NET in window based application.		

LAB PROGRAMS:

1.Write a program to calculate simple and compound interest.

2. Write A Program in C# To Check Whether a Number Is Palindrome Or Not.

3. Write A Program in C# To Demonstrate Command Line Arguments Processing

4. Write A Program in C# To Find the Roots of Quadratic Equation.

5. Write Programs Using Conditional Statements and Loops:

Generate Various Patterns (Triangles, Diamond and Other Patterns) With Numbers.

6. Write Programs Using Conditional Statements and Loops:

A. Test for Prime Numbers.

B. Generate Prime Numbers.

C. Reverse A Number and find if palindrome or not.

7. Write A Program to Accept a Number from The User and Throw an Exception If the Number Is Not An Even Number.

8. Write A Program in C# To Demonstrate Boxing and Unboxing.

9. Write A Program in C# To Implement Stack Operations.

10.Write A Program to Demonstrate Operator Overloading.

11. Write A Program in C# To Find the Second Largest Element in A Single Dimensional Array.
12. Write A Program in C# To Multiply to Matrices Using Rectangular Arrays.
13. Find the Sum of All the Elements Present in A Jagged Array Of 3 Inner Arrays.
14. Write A Program to Reverse a Given String Using C#.
15. Using Try, Catch and Finally Blocks Write a Program in C#, To Demonstrate Error Handling.
16. Design A Simple Calculator Using Switch Statement in C#.
17. Demonstrate Use of Virtual and Override Key Words in C# With a Simple Program.
18. Implement Linked Lists in C# Using the Existing Collections Name Space.
19. Write A Program to Demonstrate Abstract Class and Abstract Methods in C#.
20. Write A Program in C# To Build a Class Which Implements an Interface Which Already Exists.
21. Write A Program to Illustrate the Use of Different Properties in C#.
22. Demonstrate Arrays of Interface Types with A C# Program.
23. Using Try, Catch and Finally Blocks Write a Program in C# To Demonstrate Error Handling.
24. Write A Program for Above Class Hierarchy for The Employee Where the Base Class Is Employee and Derived Classes Are Programmer and Manager. Here Make Display Function Virtual Which Is Common for All and Which Will Display Information of Programmer and Manager Interactively.
25.List of employees is available in list box. Write an application to add selected or all records from list box (assume multi-line property of textbox is true).
26.Create an application that allows the user to enter a number in the textbox named "getnum". Check whether the number in the textbox "get num" is palindrome or not. Print the message accordingly in the label control named lbl display when the user clicks on the button "check".

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
V	GD21B5K1	Entrepreneurial Skills	2	0	0	2	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Understand the concept of entrepreneurial skills, self-confidence and attitude.	1,2	2,3
CO2	Understand the role of entrepreneurs in economic development, and barriers, Identification of business opportunities, feasibility studies, assertiveness.	1,2	2,3
CO3	Understand the contents of time management and networking.	1,2	2,3
CO4	Understand about team organization, management.	1,2	2,3
CO5	Know about creativity, innovation and creative problem solving.	1,2	2,3
CO6	Understand about confrontation and conflicts in entrepreneurship	1,2	2,3

MODULE - I

Entrepreneurial skills in perspective: introduction, overview, achievement orientation, internal focus of control, creativity and innovation.

Self-confidence and positive attitude: introduction, destructive power of negative attitude, principles for developing positive attitude.

MODULE - II

Business achievement and goal setting: business achievement, key factors for business achievement, guidelines for goal setting.

Assertiveness, an active way of shaping life: introduction, main types of behavior, how to become more assertive.

MODULE - III

Time management: introduction, phases of time management, controlling your work time, balancing your time, effective time management techniques.

MODULE - IV

The role of team work in management process: introduction, the management process, introducing new millennium with new technologies, the nature of leading, leadership qualities and principles, leadership styles and implications, leadership competencies, workforce empowerment, management implications for leadership.

MODULE - V

Creativity and creative problem solving: introduction, characteristics of a creative person, the creative process techniques, generating ideas, evaluating and prioritizing the ideas, cognitive and knowledgeable skills.
MODULE - VI
Innovation: introduction, innovation in perspective, innovation strategies, conditions for innovation, implementation of innovation.

Textbooks:

1. Entrepreneurial skills, second edition, editor cecile Nieuwenhuizen.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMSETER-VI

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
	Professional Core										
1	GD21B6C1	Game Development and Documentation	3	2	0	5	4	50	50	100	W
2	GD21B6C2	Modelling, Texturing and Lighting Games	3	0	0	3	3	50	50	100	W
3	GD21B6C3	Database Management system	3	2	0	5	4	50	50	100	W
4	GD21B6C4	Augmented Reality (AR) and Virtual Reality (VR)	3	2	0	5	4	50	50	100	W
5	**Professional Elective-II**		3	2	0	5	4	50	50	100	W
	Laboratories/Studios/Practical										
6	GD21B6P1	Unity-II Lab	1	0	4	5	5	50	50	100	P
7	GD21B6P2	3D Modelling Lab	0	0	4	4	4	50	50	100	P
Open Elective											
8	GD21B6O1	Open Elective	12	0	0	2	2	50	50	100	W
		Total	**18**	**8**	**8**	**34**	**30**				

Professional Elective -II

S.No	Course Code	Course Title
1	GD21B6E1	Cloud Computing
2	GD21B6E2	Data Science
3	GD21B6E3	Data Analytics

Note: W- Written, P- Practical, J-Jury

(all Practical and Jury semester end exams for GDT will be followed by Viva- Voce or time problem along with viva-voce)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6C1	Game Development & Documentation	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand technical aspects of game development using front end supportive web scripts, JavaScript and html ct-oriented programming	3,4	1, 2
CO2	To provide knowledge on technical aspects of game development using front end supportive web scripts, JavaScript and html5.	3,4	1, 2
CO3	To introduce fundamentals of Game Engines, Game Requirements and Game Documentation to the students.	3,4	1, 2
CO4	To Acquire Knowledge on Game Development Technical Aspects, User input, Graphics, Audio, Game Engine Architecture.	3,4	1, 2
CO5	To Understand the Fundamentals of Graphics and styling, Music and sound effects used. Game Logic, Artificial intelligence, Scene management, Collision Detection	3,4	1, 2
CO6	To Gain Knowledge in Networking, Delivery platform & hardware/software requirements for running the game, Funding and marketing	3,4	1,2

MODULE - I

JavaScript Language Fundamentals: Introduction to JavaScript
Project design and organization, Programming language fundamentals, Data types, Object-oriented programming (review), Containers, Exceptions, Delegates and Events, String manipulation.

MODULE – II

Introduction to HTML5: Introduction of HTML, HTML attributes, HTML styles, HTML colors, HTML API, HTML forms, HTML graphics, HTML media.

MODULE – III

Introduction to Mathematics, Cartesian Coordinate Systems, World space, object space, camera space, Vectors, Matrices.
Game documentation, Name of the game, List of all features, Choice of Game engine, Game description, Main characters, Story, The game play, Goal, Player skill.

MODULE – IV

Game Design and Development, Cultural and function definition of games, Rudiments of game design, Development processes, Game Development Technical Aspects, User input, Graphics, Audio, Game Engine Architecture, Publication. Lessons from the Underground: DIY/Indie techniques, XNA Content Pipeline.

MODULE – V
Game mechanics, High level diagrams, Details about the 3D objects, terrain, scenes, Abilities and power-ups, Levels and challenges, Losing, Graphics and styling, Music and sound effects used. Art tools, Game Logic, Artificial intelligence, Scene management, Collision Detection.
MODULE - VI
Technical description, Networking, Delivery platform & hardware/software requirements for running the game, Funding and marketing, Demographics, Monetization policy.

Text books:

1. Learning C# by Programming Games by Wouter van Toll, ArjanEgges, JeroenD.Fokker.
2. Game Mechanics: Advanced Game Design (Voices That Matter) 1st Edition by Ernest Adams.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6C2	Modelling, Texturing and Lighting Games	3	0	0	3	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To Understand the Fundamentals of 3D Modelling as Environment Modelling, Inorganic Modeling, Organic Modeling	3,5	1, 2
CO2	To Gain Knowledge on animation technology like Texturing, Process of Texturing, 2D-textures ,3D-textures, Assigning textures to material attributes.	3,5	1, 2
CO3	To Gain Knowledge on animation technology like lighting in games and related issues.	3,5	1, 2
CO4	To apply different types of modelling, shadows, lights and rays practically on a project.	3,5	1, 2
CO5	To Gain Knowledge on animation technology like Batch Rendering, Render Engines, Importance of Mental Ray, Using the Render Settings window to prepare a scene for lighting.	3,5	1, 2
CO6	To Gain Practical Knowledge to Solve any animation problems with the Chess Animation, Adding texture to a deforming character mesh, Lighting for animation.	3,5	1, 2

MODULE - I

Introduction to 3D Basics Modelling to Animation

3D Projections, Modelling of Objects, Concept of 3D Modeling, User Interface, Polygon Primitives, Modeling tools-Deformers, Inorganic Modeling, Organic Modeling., basics of texturing,Basics of Rigging, Basics of Animation, Basics of Rendering.

MODULE - II

Texturing 3D Models

Basic Texturing, Introduction to textures, Process of Texturing, Discuss Hyper shade, 2D textures-3D textures, Defining textures vs. materials, Assigning textures to material attributes, Texture nodes and utility nodes.

MODULE - III

Introduction –Lighting

Use of Lighting in Animation, Theory of Lighting, Theory of Color, Basic concepts of Lights, Light attributes, Lighting in 3D, The application of lighting in 3D, Types of lights and their uses, Good lights (directional, spot, point, and area), Bad lights (ambient and volume).

MODULE - IV
Introduction - Shadows Terminology, Ray traced and Buffered shadows, soft shadows, Indirect lighting, shadow panel, Ambient Occlusion
MODULE - V
Introduction- Rendering Batch Rendering, Render Engines, Importance of Mental Ray, render passes, Using the Render Settings window to prepare a scene for lighting, Memory efficiency and pipeline specific differences of each renderer, Render settings.
MODULE - VI
The Final Project, Solve any animation problems with the Chess Animation, Adding texture to a deforming character mesh, Lighting for animation, Discuss the Final Project.

Text Books:

1. 3D Animation Essentials 1st Edition by Andy Beane

Reference Books:

1. 3D Art Essentials: The Fundamentals of 3D Modeling, Texturing, and Animation 1st Edition by
Ami Chopine.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6C3	Database Management System	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To understand the basic concepts and the applications of database systems.	1,3	2,4
CO2	To master the basics of SQL and construct queries using SQL.	3,4	2,3
CO3	To understand the relational database design principles.	3,4	2,3
CO4	To become familiar with the basic issues of transaction processing and concurrency control.	4,5	2,3,6
CO5	To become familiar with database storage structures and access techniques.	3,4,5	2,3,6

MODULE - I (CO1)

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model– Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.

MODULE - II (CO2)

History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

MODULE - III (CO3)

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.
Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

MODULE - IV (CO4)

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins– Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

MODULE - V (CO4)

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.
Transaction Concept- Transaction State- Implementation of Atomicity and Durability- Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

MODULE - VI (CO5)

Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of non-volatile storage- Advance Recovery systems- Remote Backup systems.
Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM)
B+ Trees: A Dynamic Index Structure.

TEXT BOOKS :

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke,TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

REFERENCES:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6C4	Augmented Reality (AR) & Virtual Reality (VR)	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To Understand The Fundamentals of main characteristics of Augmented Reality systems and the main components of AR architecture.	4,5	1, 2
CO2	**To Gain knowledge on basics of Augment City Map, Image recognition, Augmented Reality with Geolocation**	4,5	1, 2
CO3	**To Understand the Fundamentals of Customizing an Augmented Reality Application, Understanding the ARAF format for AR Application**	4,5	1, 2
CO4	To Acquire knowledge on basic of AR/VR technology and devices	4,5	1, 2
CO5	To understand various elements and components used in AR/VR Hardware and Software.	4,5	1, 2
CO6	To apply AR/VR technology in industry with hands on experience through more informative and practical exploration.	4,5	1, 2

MODULE - I

Introducing Mixed and Augmented Reality
Key concepts and techniques of Mixed and Augmented Reality. Explaining business aspects of augmented reality: the AR market, the potential applications and the value chain. ThemaincharacteristicsofARsystemsandthemaincomponentsofARarchitecture.

MODULE - II

Augment City Map:
Image recognition and tracking process to enrich an image with a3D object. An AR application that will augment a city map with a 3Dmodel.
Augmented Reality withGeolocation:
Geolocation in Augmented Reality and step by step in the creation of an AR geolocalized Application.

MODULE - III

Customizing an Augmented Reality Application:
UnderstandingtheARAFformatforARApplicationandthenhowtoprogramitandchangethebehaviooftheapplication.

MODULE - IV
Virtual Reality-Hardware and History: Basics of VR, Definition of Virtual Reality, exploring VR hardware, demonstrations of arrange Of VR Head Mounted Devices. History of Virtual Reality and drafting your ideas for a VR application.
MODULE - V
VR Applications: Different applications of VR- from news and documentaries, to sports, therapy, and games. VR Technical Framework, thoughts on VR applications.
MODULE – VI
The Psychology of VR: **The Three Illusions Place Illusion, Plausibility Illusion, and Embodiment Illusion, with some interesting trick along the way** **3DGraphics:** 3D Virtual Reality Environments. Basics of 3D graphics, 3D engines and development environments.

TextBooks:

1. Augmented Reality: Principles & Practice Paperback by Schmalstieg /Hollerer.

Reference Books:

1.ArtificialIntelligence Meets Augmented Reality by ChitraLele.MODULEy2018Augmented Reality Projects:Build four immersive and fun AR applications using AR Kit, ARCore, and Vuforia by JesseGlover.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6E1	CLOUD COMPUTING	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand basic cloud computing areas, access, services.	1,2	1, 2
CO2	Learn about benefits and security levels of cloud computing.	2,4	1, 2
CO3	Demonstrate architecture and services provided by cloud for an application.	2,3,4	1, 2
CO4	Know about different layers and deployment models of cloud.	2,3	1, 2
CO5	Understand about simulation in cloud using green cloud and cloud sim.	2,3,4	1, 2
CO6	Demonstrate cloud simulation using VMware simulator.	2,3	1, 2

Module-I: Cloud Computing Overview

Origins of Cloud computing–Cloud Components-Essential characteristics–On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity, Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

Module-II: Cloud Insights

Architectural influences–High-performance computing, Utility and Enterprise grid computing, Cloud scenarios–Benefits: scalability, simplicity, vendors, security, Limitations–Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

Module-III: Cloud Architecture

Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform asa Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaSandbenefits, Service providers,challenges and risks in cloud adoption.

MODULE – IV

Layers and Models: Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds -Advantagesof Cloud computing.

MODULE – V Cloud Simulators-Cloud Sim and Green Cloud
Introduction to Simulator, understanding Cloud Sim simulator ,Cloud Sim Architecture(Usercode,CloudSim,GridSim,SimJava)UnderstandingWorkingplatformforCloudSim,IntroductiontoGreenCloud.
MODULE – VI Introduction to VM Ware Simulator
Basics of VMWare, advantages of VM ware virtualization, using VM ware workstation, creating virtualmachines-understanding virtual machines, create a new virtual machine on local host, cloning virtualmachines,virtualizesa physical machine, startingandstoppinga virtual machine.

Text Books:

1. Cloud computing a practical approach- Anthony T. Velte,Toby J.Velte Robert Elsenpeter, TATAMcGraw - Hill, NewDelhi–2010

2. CloudComputing: Web-Based Applications That Change the Way You Work and Collaborate Online –Michael Miller-Que, 2008

References:

1. Cloud computing for dummies-Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Wiley Publishing, Inc, 2010

2. Cloud Computing (PrinciplesandParadigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski ,JohnWiley&Sons, Inc. 2011

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6E2	DATA SCIENCE	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand the basics of python and R programming related to data science.	1,2	1, 2
CO2	Learn topics of statistics like tendency, variability etc.	2,4	1, 2
CO3	Know topics of inferential statistics.	2,4	1, 2
CO4	Understand supervised and unsupervised data in ML.	1,2	1, 2
CO5	Learn about regression and classification.	2,4	1, 2
CO6	Work with tableau and its data.	2,4	1, 2

MODULE – I

Python : Environment set-up, Jupiter overview, Python Numpy, Python Pandas, Python Matplotlib.

- **R Programming:**An introduction to R, Data structures in R, Data visualization with R, Data analysis with R

MODULE – II

Statistics :Important statistical concepts used in data science, Difference between population and sample, Types of variables, Measures of centraltendency, Measures of variability, Coefficient of variance, SkewnessandKurtosi**s.**

MODULE - III

Inferential statistics: Normal distribution, Test hypotheses Central limit theorem,Confidence interval, T-test, Type I and II errors, Student's T distribution.

MODULE - IV

Regression and Anova :Regression, ANOVA,R square, Correlation and causation

Exploratory data analysis :Data visualization, Missing value analysis, The correction matrix, Outlier detection analysis.

MODULE - V

Supervised machine learning: Python Scikit tool, Neural networks, Support vector machine, Logistic and linear regression, Decision tree classifier.
MODULE - VI
Tableau: Working with Tableau, Deep diving with data and connection, Creating charts, Mapping data in Tableau, Dashboards and stories.

Text books:

1. An Introduction To Statistical Learning With Applications In R Book, Gareth James.

2. Data Science and Machine Learning (English, Paperback, N. Meenakshi K. E. Rajakumari S. Hariharasitaraman).

Reference Books:

1. Data Science & Analytics (English, Paperback, V.K. Jain).

2. Data Science 101 (English, Hardcover, Park Andrew).

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6E3	DATA ANALYTICS	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Understand about probability and categories of statistics.	2,4	1, 2
CO2	Learn about regression characteristics.	2,4	1, 2
CO3	Identify unsupervised and supervised data.	2,4	1, 2
CO4	Generalise data using regression and classification.	2,4	1, 2,5
CO5	Learn about unsupervised data and data analytics.	2,4	1, 2,4
CO6	Design experimental data for reinforcement learning.	2,3,4	1, 2,6

MODULE – I

Descriptive Statistics :Introductiontothecourse,DescriptiveStatistics,ProbabilityDistributions.
Inferential Statistics : InferentialStatisticsthroughhypothesistestsPermutation&RandomizationTest.

MODULE - II

Regression & ANOVA : Regression ANOVA(AnalysisofVariance)
Machine Learning: Introduction and Concepts Differentiating algorithmic and model based frameworks Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification.

MODULE - III

Supervised Learning with Regression and Classification techniques -1
Bias-Variance Dichotomy Model Validation Approaches Logistic Regression, Linear Discriminant Analysis Quadratic Discriminate Analysis Regression and Classification Trees Support VectorMachines

MODULE - IV

Supervised Learning with Regression and Classification techniques-2
Ensemble Methods: Random Forest Neural Networks Deep learning

MODULE - V

Unsupervised Learning and Challenges for Big Data Analytics
Clustering Associative Rule Mining Challenges for big data analytics.

MODULE - VI

Prescriptiveanalytics:
Creating data for analytics through designed experiments Creating data for analytics through Active learningCreating data for analytics through Reinforcementlearning

Text books:

1. Hastie,Trevor, etal.The elements of statistical learning. Vol.2.No.1.NewYork: springer,2009.

Reference Books:

1. Montgomery,Douglas C.,andGeorge C.Runger.Applied statistics and probability for engineers. John Wiley &Sons,2010

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6P1	Unity-II Lab	1	0	4	5	50	50	100

Cos	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Learn how to Install unity Development Environment,IDE Basics,unityConcepts,Introduction to Scripting ,C# Language Concepts.	4,5	1, 2
CO2	Learn how to create Simple Movement and Input ,Simple Movement Simple Rotation and Scaling	4,5	1, 2
CO3	Learn how to use 2D Physics Concepts, Rigid body Components, Decisions and Flow Control, Loops and Arrays	4,5	1, 2
CO4	Learn how to Organizing Game Objects,Parent-Child Objects,SortingLayers,Tagging Game Objects,Collision Layers	4,5	1, 2
CO5	Learn how to create Object-Oriented Concepts,DefiningClasses,Creating and Using Classes, DefiningFunctions,AccessingGameObjects, Constructor and Property Function.	4,5	1, 2
CO6	Learn how to Managing Game ObjectsPrefabs,Creating and Destroying Objects,Activating and Deactivating Objects,Controlling Object Lifespans with invoke.	4,5	1, 2

MODULE – I

1. unity Development Environment
a. IDE Basics
b. unity Concepts
2. Introduction to Scripting
3. C# Language Concepts

MODULE – II

1. Simple Movement and Input
a. Simple Movement
b. Simple Rotation and Scaling
c. Easy Input Handling in unity Alien Dance Squad 7

MODULE – III

1. 2D Physics Concepts
a. Rigid body Components
b. unity Colliders
c. Physics Materials

d. Scripting Collision Events
MODULE - IV
1. Decisions and Flow Control a. Logical Expressions b. “if/else” Statements c. "switch" Statements 2. Loops and Arrays a. Arrays b. for() and foreach() Loops c. while() Loops
MODULE - V
1. Organizing Game Objects a. Parent-Child Objects b. Sorting Layers c. Tagging Game Objects d. Collision Layers.
MODULE - VI
1. Object-Oriented Concepts 2. Defining Classes 3. Creating and Using Classes 4. Defining Functions 5. Accessing Game Objects 6. Constructor and Property Function
Module VII
1. Managing Game Objects 2. Creating and Destroying Objects 3. Activating and Deactivating Objects 4. Controlling Object Lifespans with Invoke

Text Books

1. MODULEy in Action: Multiplatform Game Development in C# with unity 5 by Joe Hocking and Jesse Schell /second edition.
2. Learning C# from Developing Games with unity 5.x first edition byGregLukosek.

Reference Books

1. Learning C# Programming with unity 3D second edition by Alex okita

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6P2	3D Modelling Lab	0	0	4	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Learn how to install Maya software,The Maya Interface Understanding Menus, Icons, Dialog Boxes, and the Maya Interface Maya View Tools Layouts, Saved Layouts	4,5	1, 2
CO2	Learn how to Design character modelling	4,5	1, 2
CO3	Learn how to do Lighting in animation Technology,Understanding the creation, attributes, positioning and management of 3D lights.	4,5	1, 2
CO4	Learn how to create and apply shaders, textures, and image maps	4,5	1, 2
CO5	Learn how to do Rigging, Using Groups, Parenting, Constraints, and IK bone changes to create hierarchical animate table models	4,5	1, 2
CO6	Learn how to do Rendering and Animation characters and Create complex objects scenes using scripts as an alternative to GUI – based tools**.**	4,5	1, 2

MODULE - I

1. The Maya Interface
2. Understanding Menus, Icons, Dialog Boxes, and the Maya Interface
3. Maya View Tools
4. Layouts, Saved Layouts,Channel Box and Manipulators

MODULE - II

1. Understanding Cameras & Basic Modeling
2. Using Maya's viewport to work with Cameras - understanding the basics of the modeling tools.SplineModelling
3. About Nurbs (Non-uniform rational B-spline)

MODULE - III

1. Lighting
2. Understanding the creation, attributes, positioning and management of 3D lights.
3. Lighting.

MODULE - IV

1. Surfacing
2. Understanding how to create and apply shaders, textures, and image maps.

MODULE - V

1. Rigging

2. Using Groups, Parenting, Constraints, and IK bone changes to create hierarchical, animate table models
MODULE - VI
1. Animation 2. Understanding Key Frames, the Graph Editor, and basic animation functions in Maya.
MODULE - VII
1. Rendering 2. An in-depth look at the render settings in Maya and how to create fully rendered animated sequences.
Module-VIII
1. Create complex objects scenes using scripts as an alternative to GUI – based tools

Reference books:

1. Getting Started in 3D with Maya by Adam Watkins.
2. 3d modeling for Beginners by DananThilakanathan.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER –VII

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	T	P	Total		Int	Ext	Total	W/P/J
Professional Core											
1.	GD21B7C1	Game Production Planning and Design	3	1	0	4	3	50	50	100	W
2.	GD21B7C2	Rigging and Animation for Games	3	0	0	3	3	50	50	100	W
3.	GD21B7C3	**Visual Effects(FX)**	3	1	0	4	3	50	50	100	W
4.	GD21B7C4	Quality Assurance for Games	3	1	0	4	3	50	50	100	W
5.	GD21B7C5	Game Mechanics	3	1	0	4	3	50	50	100	W
Laboratories/Studios/Practical											
6.	GD21B7P1	Rigging and Animation Lab	0	0	4	4	4	50	50	100	P
7.	GD21B7P2	Unity-III Lab	0	0	4	4	4	50	50	100	P
Mini Project											
8.	GD21B7MP	Theft Auto-II & III Mini Project	0	2	3	5	4	100	-	100	P
Open Elective											
9.	GD21B7O1	Open Elective	2	0	0	2	2	100	-	100	-
Skill Enhancement Course											
9	GD21B7K1	SWAYAM / NPTEL	0	0	0	0	1	-	-	-	NIL
		Total	**17**	**6**	**11**	**34**	**30**				

Note: W- Written, P- Practical, J-Jury (all Practical and Jury semester end exams will be followed by Viva- Voce or time problem along with viva-voce)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7C1	Game Production Planning and Design	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand structure of Games	2,3	1, 2
CO2	Know about the structure and break down of games.	2,3	1, 2
CO3	Demonstrate roles and responsibilities of different types of people working in game environments.	6,9,10	1, 2
CO4	Understand game production process, integration at each phase and cycles.	2,3,4	1, 2
CO5	Study game iteration process and game development.	3,5	1, 2, 6
CO6	Create game module using different platforms.	2,3,4	1, 2, 4, 6

MODULE - I

STRUCTURE OF GAMES : The structure of games ,analysis and break down of children's games in terms of structure.
GAME ANALYSIS: Play and analysis of a game of choice. Presentation of analysis, detailing 'Fun' aspect, game play, structure and break down of why it is 'Fun'.

MODULE – II

TEAM AND STUDIO STRUCTURE: The different roles and responsibilities of people working in game studios and working on projects.
GAMEPRODUCTIONCYCLES: Different types of game projects, game production procedures and cycles.

MODULE – III

PRODUCTION PIPELINES: Different stages of game production, and the challenges/responsibilities of each stage.
GAME ART PIPELINES: Research, conceptualization, production and integration of art into games.
THE ITERATIVE PROCESS: The definition of iteration and iterative processing game development; successful iterative practices.

MODULE – IV

Game Industry Overview: Introduction, Game Development Framework, Financing Options, Revenue Models Platforms, Distribution Options.
Developer and Publisher Overview : Introduction, Function of Developer, Function of Producer, Function of Publisher, Publishing your Game.

MODULE – V
Creating the Prototype : Introduction, what are the Goals, who are the Stakeholders, Third-Party considerations, Milestones, Project Management. **Creating Concept :** Introduction, Brainstorming, Initial Concept, competitive Analysis, SWOT Analysis, Concept Treatment.
MODULE – VI
Establishing Requirements : Schedule: Introduction, Why Schedules are Important, creating a Schedule, Work Breakdown structures, Estimates, putting it all Together, Tracking Tasks. Budget: Introduction, Budgets, Cost Breakdowns, tracking a Budget, Mitigating Budget Overages. **Hiring Talent, Team Organization, Managing your Team :** Introduction, Job Descriptions, Finding Applicants, Interview Process, Onboarding New Employees, Training, Retention, Defining Roles and Responsibilities, Organizing the Team, Strike Teams, Working with Remote Team Members, Team Leadership, Team Building, Team Communication, Outsourcing.

Text books:

1. **Pre-production planning for video, film and multimedia by cartwright.**
2. **The Game Production ToolBox – Heather Maxwell Chandler, CRC Press.**
3. **Game Production Handbook by Heather Maxwell Chandler.**

References:

1. **Producing Games**. From Business and Budgets to Creativity and Design.
2. Rules of Play:GameDesignFundamentals,KatieSalen/EricZimmerman
3. https://www.juegostudio.com/pre-production

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7C2	Rigging and animation for games.	3	0	4	5	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand basics and core principles of 3d rigging.	1,2	1, 2
CO2	Understand bone creation, tools and ik&fk mechanics.	2,4,5	1, 2
CO3	Learn prop rigging for games and constraints.	2,3	1, 2
CO4	To identify techniques used to create a technically rigorous character pipeline and character rigging.	2,4,5	1, 2,6
CO5	Study animation basics, character design with tools.	3,4,5	1, 2, 6
CO6	Know about body mechanics and animation cycles.	2,3,4	1, 2, 6

MODULE – I: Core Principals of 3D Rigging

Gaining knowledge on Animation requirements, Anatomy and kinematics to achieve proper deformation and influence. Study to create animation controllers and custom attributes to drive them to make animation friendly rigs.

MODULE – II: Understanding Bone creation and Deform tools

How to create bone setups using bone creation tool and understanding linear and nonlinear deformation tools like bend, warp and lattices.

IK and FK Mechanics: Understanding IK and FK mechanics and how to use them learning tools and their solver settings for tools like IK handle, IK spline handle.

Skinning Concepts: Learning different skinning techniques like rigged binding, smooth binding and interactive binding and how to paint and balances kin weights using editors like component editor and paint skin weight tool etc.

MODULE – III: Prop Rigging for Games

Rigging props like cars and other mechanical objects using set drive key concepts usage of constrains, expressions and attributes to enhance the rigging functionality.

MODULE – IV: Intro to Character Rigging

Study to combine skeleton, inverse kinematics (IK), and constraint tools to create a basic rig for a character, and how to attach the character mesh to the skeleton using skinning tools and creating custom rig setups like reverse foot lock, IK/FK spline, IK/FK switchable hands etc. and finally assembling the total rig with proper prefixing

and naming.
MODULE – V: 3D Animation basics
Introducing animation principals and concepts in a 3d Program, learning tools and techniques to create animation in 3D, understanding functional curve sand working in graph editor to create key frame-based animations. Implementing timing and spacing with other animation principals to animate in animate3D objects to master the concepts of key frame animation and management of functional curve stooptimize use of key frame sandin- between switch proper timing and spacing in animation example ball bounce, pendulum, etc
MODULE – VI: Body Mechanics and 3D Game Animation Cycles
Understanding how human body mechanics work concepts like IK(Inverse kinematics), FK(Forward kinematics), Balance, weight, Posing and Line of action. Working with Human rig sets understanding their functions and custom attributes. Understanding Looping and cyclic actions are integral part of a game animation this section we will study all possible important cyclic actions and their different variations depending on gender, weight, mood and age needed in a 3d game like Walk cycle, run cycle, Jumpandidle etc.

REFBOOKS:

1. The Animator's Survival Kit(Richard Williams)

2. Character Animation 2D Skills for Better 3D2nd.Edition(SteveRoberts)

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VI	GD21B6C3	Visual Effects(FX)	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	Learn how to Install FX software, Install Processing	4,5	1, 2
CO2	Learn how to setting up backgrounds, downloading characters, Importing characters, Setup Animations, Animation scripting	4,5	1, 2
CO3	Learn how to use Combat Animations, Spinning Jump, Combat Setup, Leg Sweep, Aerial Moves, Flip Animations	4,5	1, 2
CO4	Learn how to use User interface**,** Health bar graphics, Knockout,Blocking,Victory animations, Heavy react fix, Jump speed fix	4,5	1, 2
CO5	Learn how to design More characters**,** Bring in More Characters, Character Images, Editing Images, Character Icons	4,5	1, 2
CO6	Learn how to select Character, Selection Screen,P1 and P2 text, Character Select Code, Character display	4,5	1, 2

MODULE - I

Introduction : Digital Compositing with CGI, Compositing Visual Effects, 3D Compositing, Stereo Compositing ,Stereo Conversion, Compositing Programs

MODULE - II

Digital Images: Structure of Digital Images Attributes of Digital Images, Image File Formats , DPI
Image Blending: Mix operation, Multiply operation, Screen Operation, Maximum Operation , Minimum operation, Add operation, Subtract operation, Adobe Photoshop Blending Modes.

MODULE - III

Compositing CGI : The CGI Composite, Multipass Compositing, Depth Compositing, Multiplane Compositing, Sims, Particle Systems, Working with premultiplied CGI, 3D Compositing.

MODULE – IV

Bluescreen Compositing: The Bluescreen Composite, About Keyers, Helping the Keyer, Compositing outside the keyer, Shooting Bluescreeens.

MODULE – V

Creating Masks: Key, Matte, Alpha and Mask, Creating a Luma-key, Creating a Chroma-key, Creatinga Mask – Difference Mask, The color Difference Mask, Geometric primitives, Drawing Shapes, Painting a

mask, Combo masks
MODULE – VI
Rotoscoping: About Rotoscoping, Splines, Articulated Rotos, Interpolation, Keyframes – On 2's, Bifurcation, Extremes, Final Inspection, Motion Blur, Semi- transparency Advanced VFX Techniques VI: Cutting Edge 3D VFX

Textbooks :

1. Compositing Visual Effects Essentials for the Aspiring Artist by Steve Wright

2. Visual Effects and Compositing Jon Gress.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7C4	Quality assurance for games	3	2	0	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand importance of quality assurance in games.	2	1,2
CO2	Know about the game team formation for testing, bugs, bug categories.	2,3	1,2
CO3	Understand fundamentals of test process and guidelines.	2,3	1,2
CO4	Study different types of testing methods and tools in detail.	2,5	1,2
CO5	Learn about the test trees and types, bug hunting.	2,3	1,2
CO6	Understand game players strategic plan and create tests.	2,3	1, 2,4

MODULE - I

Introduction: What is Quality, Quality Assurance, Need for Quality Assurance, What is a Tester? Intro to Testing, Identifying Bugs.

MODULE – II

Two rules of game testing: world games don't panic, un familiar un prepared under pressure , unrested, late night testing check list, pretest posttest, trust no one ,balancing act, trust fund, last chance, give and take the rest of the story.

MODULE – III

Being a game tester: playing games, identifying bugs, here comes the judge, amplifying problems, early bird, places everyone, notifying the team, describe, pick a severity, prioritize, be helpful, pass or fail, testify to others, verify the fix, exercises the references.

Why testing is important: functions assignments, checking, timing, algorithms, documentation.

MODULE – IV

Test Flow Diagrams: TFD elements, flows, events, actions, states, primitives, terminators, TFD design activities, preparation, allocation, construction, ATFD example, data dictionary, TFD path, minimum path generation, base path line method, combining path strategies, producing test cases from path.

MODULE – V

The game testing Process: Black Box, White Box Testing life cycle of a build, test cases and test suites, entry criteria, configuration preparation, smoke testing, regression testing , testing around a bug, on writing bugs well, brief description, full description, great expectation, habits to avoid.
MODULE - VI
Testing by the numbers: Testing progress, testing effectiveness, tester performance. **Combinatorial testing :** Para meters , values, defaults, enumerations , ranges, boundaries, constructing tables, combinatorial templates.

TEXT BOOKS:

1. Game testing all in one third edition : Charles P.SCHULTZ and ROBERT D.BRYANT :: ISBN 798-1942270768 Mercury learning and information.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7C5	Game Mechanics	3	1	0	3	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able		
CO1	To learn The Game mechanics are the precisely specified rules of a game and Continuous mechanics are usually implemented in real time	2,3	1, 2, 5
CO2	To understand how we explored the categories of games of emergence and games of progression	2,3	1, 2, 4, 5
CO3	To Analyze how we introduced the essential elements of an internal economy: resources, entities, and some of the mechanics that manipulate them, including sources, drains, converters, and traders.	2,3	1, 2, 4
CO4	To understand how a concept of design patterns: recurring structures that appear in architecture, software, games, and other fields	2,3	1, 2, 6
CO5	To study how to balance a game, you must play test it many times, and this can be difficult with long and complex games. The Machinations Tool lets you simulate play tests rapidly by creating artificial players that execute simple strategies automatically.	2,3	1, 2, 5
CO6	To understand how we have examined ways to communicate messages with games, particularly with game mechanics	2,3	1, 2, 4

MODULE - I

Designing Game Mechanics Rules Define Games, Games Are Unpredictable, From Rules to Mechanics, Mechanics Are Media-Independent, Five Different Types of Mechanics, Mechanics and Game Genre, Discrete, Understanding the Mechanics of Physics, Innovating with Discrete Mechanics, Prototyping Techniques

MODULE - II

Emergence and Progression The History of Emergence and Progression ,Comparing Emergence and Progression ,Games of Emergence ,Games of Progression, Structural Differences, Emergence and Progression Integration

MODULE - III

Internal Economy Elements of Internal Economies, Resources, Entities, Four Economic Functions ,Economic Structure, Economic Shapes , The Shape of a Game of Chess, From Mechanics to Shapes, Deadlocks and mutual dependencies, Uses for Internal Economies in Games

MODULE - IV

Design Patterns Introducing Design Patterns , design patterns vs. design vocabularies , Design Patterns in Games, Machinations Design Pattern Language , Engines , Friction , Escalation , Miscellaneous Patterns ,Leveraging Patterns for Design

MODULE – V
Simulating and Balancing Games Simulated Play Tests , Artificial Players in Machinations, Collecting Data from Multiple Runs , Designing Artificial Player Strategies ,Playing with *Monopoly*, Simulated Play-Test Analysis, Rent and Income Balance, Adding Dynamic Friction Balancing *SimWar*, From Model to Game
MODULE - VI
Meaningful Mechanics Serious Games, Early Serious Games, Serious Video Games, gamification, Communication Theory, How the Medium Affects the Message, How Mechanics Send Messages, Design Challenges, The Semiotics of Games and Simulations, Games and Simulations, Multiple Layers of Meaning, Contrast Between Appearance and Mechanics

Textbooks:

1. Game Mechanics Advanced Game Design, by Ernest Adams, Joris Dormans Released June 2012, Publisher(s): New Riders, ISBN: 978-0321820273

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7P1	Rigging and animation for games.	0	0	4	4	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand basics and core principles of 3d rigging.	1,2	1, 2
CO2	Understand bone creation, tools and ik & fk mechanics.	2,4,5	1, 2
CO3	Learn prop rigging for games and constraints.	2,3	1, 2
CO4	To identify techniques used to create a technically rigorous character pipeline and character rigging.	2,4,5	1, 2,6
CO5	Study animation basics, character design with tools.	3,4,5	1, 2, 6
CO6	Know about body mechanics and animation cycles.	2,3,4	1, 2, 6

1. Creating animation controllers and custom attributes to make animation friendly rigs.

2. Creating bone setups using bone creation tool and understanding linear and nonlinear deformation tools like bend, warp and lattices.
3. Usage of skinning techniques
4. Rigging Mechanical Objects
5. Combining Skeleton, Inverse Kinematics.
6. Creating Basic animation with rigged objects.

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7P2	Unity -III	3	0	4	5	50	50	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand totally about game design Direct and indirect Lighting, Light sources.	2,3	1, 2
CO2	Know about the Game Light System shadows and Reflection.	2,3	1, 2
CO3	Understand game shaders core concepts and understanding shader performance.	1,2	1, 4
CO4	Understand game material inspector reference and colors math function.	2,3,5	1, 2
CO5	Study game user interface and design controls.	3,5	1, 2
CO6	Know about the structure of scrolling games and animation environment	2,3,4	1, 2,6

MODULE – I

Light system

a) Lighting Overview
b) Lighting Window
c) Light Explorer
d) Light Sources
e) Using Lights

MODULE – II

Shadows and Reflection

a) Shadows
b) Directional light shadows
c) Shadow cascades
d) Visualising shadow parameter adjustments
e) Shadow Pancaking

MODULE – III

Shaders

a) Shaders core concepts

b) Built-in Shaders

c) Understanding shader performance

MODULE – IV

Materials

a) Materials Introduction

b) Material inspector reference

c) Colors and math function (lerp)

MODULE - V

User Interface

a) Creating canvas UI layer

a. Event system

b) Basic layout

a. Rect tool

b. Rect transform

c. Pivot

d. Anchors

c) Visual components

a. Text, pro text mesh

b. Image, raw image

d) Interaction components

a. Button, toggle, toggle group

b. Slider, scrollbar

c. Dropdown

d. Input Field

e) Auto layout

a. vertical layout

b. horizontal layout

Grid layout

MODULE - VI

Animation's system

a) Animation clips
b) Animator controllers
a. Create state machine
b. Animation parameters
c. Sub-state machines
d. Animation layers
c) Retargeting of Humanoid animations

After Completing this modules sample Project will be done using all these concepts for students understanding .

REFERENCE BOOKS:

1. Unity in Action: Multiplatform Game Development in C# with Unity 5 by Joe Hocking and Jesse Schell /second edition.

2. Learning C# from Developing Games with Unity 5.x first edition by Greg Lukosek.

3. Learning C# Programming with Unity 3D second edition by Alex okita 4.3D Game Engine Programming by Stefan Zerbstand Oliver Duvel

https://docs.unity3d.com/Manual/class-AnimatorController.html

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VII	GD21B7MP	THEFT AUTO- III Mini Project	1	0	4	5	100	-	100

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand basics of game play and plot settings.	2,3	1, 2
CO2	Know about media used in playing games.	2,3	1, 2
CO3	Demonstrate roles and movements of characters in game.	6,10	1, 2
CO4	Understand game story missions and side missions.	2,3	1, 2
CO5	Study game proceeding process.	2,4	1, 2
CO6	Create different situations in game.	2,3,4	1, 2

MODULE - I
Plot: Setting, Story, Characters Game Play: Mission non-linearity and Narration, Weapons, Radio Stations and other Media.
MODULE – II
Appendices: Rampages, Hidden Packages, Vehicle Missions, Unique Stunt Jumps, Import- Export Garage, 100% Completions.
MODULE – III
Story Missions: Portland, Staunton Island, Shoreside Vale.
MODULE – IV
Side Missions: The Crook, The Thieves, The wife, Turismo, trial by fire.
MODULE –V
Patriot Playground, A ride in the park.
MODULE – VI
Mafia Massacre, Diablo Destruction, Casino calamity, Rumpo Rampage

Text books:

1. Grand Theft Auto-III strategy guide

2. The Meaning and Culture of Grand Theft Auto By Nate Garrelts

S.No	Course Code	Course Title	Periods per Week				Credits	Marks			End Exam
			L	S	P	Total		Int	Ext	Total	W/P/J
1	GD21B8IN	Internship	-	-	-	-	10	100	-	100	P
2	GD21B8PW	Major Project	-	-	-	-	20	100	100	200	P
		Total					**30**				

SEMESTER - VIII

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VIII	GD21B8IN	Internship	-	-	-	10	100	-	100

COs	Course Outcomes	POs	BTLs
	The student will		
CO1	Gain practical knowledge on the application of Game Designing in the industry/research	NA	NA

The student must submit and present a seminar report on the internship done

Pattern of Evaluation for Industrial/ Research – 100 Marks

1. Internship Report : 40 Marks
2. Presentation : 40 Marks
3. Internship certificate issued by the organization : 20 Marks

Dr. YSRAFU Choice Based Credit System for
B.Tech.(Game Design Technologies) Program, effective from 2021 – 22

SEMESTER	Course Code	Course Title	L	T	P/ S	C	Int. Marks	Ext. Marks	Total Marks
VIII	GD21B8PW	Project Work	0	0	20	20	100	100	200

COs	Course Outcomes	POs	BTLs
	The student will be able to		
CO1	Understand various tasks that can be taken up as project work	1,3,6,9	
CO2	Work in a team to select a Theme for project work	1,3,6,9	
CO3	Review and evaluate the available Legacy on the chosen theme	1,3,6,9	
CO4	Apply the principles, tools and techniques to design a Game Design	1,3,6,9	
CO5	Prepare and present project report	1,3,6,9	

Out of the total evaluation is for 200 marks 100 marks shall be for internal evaluation and 100 marks for the external evaluation at the end of the semester. External evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent of Examinations. The committee consists of an external examiner, HOD and internal guide.

Division of marks for internal assessment – 100 marks

1. Progress of Project work at the end of 10 weeks : 20 Marks
2. Evaluation by the Internal Guide (at the end of 15 weeks) : 20 Marks
3. Project Report : 20 Marks
4. Final Project presentation : 40 Marks

Pattern of External Evaluation for Project – 100 Marks

- Final Project Report : 25 Marks
- Presentation : 25 Marks
- Demonstration / Defense of Project : 50 Marks

Dr. YSRAFU Choice Based Credit System for

B.Tech.(Game Design Technologies) Program, effective from 2021 – 22