APPENDIX – E
MADURAI KAMARAJ UNIVERSITY
(University with Potential for Excellence)
Accredited by NAAC with 'A++' Grade in the 4ᵗʰ Cycle

Syllabus for

B.Sc. Computer Science (Animation and Game Designing)
CBCS- Semester Pattern
(for those who joined in the academic year 2022-23 and after)

Regulation, Scheme of Examination and Syllabus

1. Course Objectives:

- To prepare the students to manage the software components in a computer independently and to be a Programmer.
- To prepare the students to develop animation content for various digital platforms
- To motivate the students to take up higher studies in Computer Science and Animation streams.

2. Eligibility for Admission:

A candidate should have studied +2 level Mathematics with Physics / Computer Science as one of the subjects in the 10 + 2 stream.

3. Duration of the Course:

The students shall undergo the prescribed course of study for a period of not less than three academic year (Six semesters).

4. Medium of Instruction : English

5. Subjects/ Structure of Course Study : See Page No.2.

6. Scheme of Examinations/ Structure of Question Paper: See Page No.6

7. Detailed Syllabus: See Page No.7.

8. Eligibility for the Degree:

i) A Candidate shall be eligible for the award of the degree on completion of the prescribed course of study and passing all the prescribed external examinations.

ii) Attendance progress, internal examinations, conduct certificate from the Head of the Institution shall be required for taking the external examination.

iii) The passing minimum and the ranking are as per the existing rule of the Choice Based Credit System for the affiliated college of the University.

(Subject/Structure of Course Study)

Sem.	Subjects							Total Hours	Total Credits
I	T1(6) [3]	E1(6) [3]	CS1(4) [4]	CS2(6) [4]	AS1(4) [4]	SBS1(2) [2]	VE (2) [2]	30	22
II	T2(6) [3]	E2(6) [3]	CS3(4) [4]	CS4(6) [4]	AS2(4) [4]	SBS2(2) [2]	EVS (2) [2]	30	22
III	T3(6) [3]	E3(6) [3]	CS5(4) [4]	CS6(4) [4]	CS7(4) [3]	AS3(4) [4]	SBS3(2) [2]	30	23
IV	T4(6) [3]	E4(6) [3]	CS8(4) [4]	CS9(4) [3]	CS10(4) [3]	AS4(4) [4]	SBS4(2) [2]	30	22
V	CS11(5) [4]	CS12(5) [4]	CS13(6) [4]	CS14(5) [3]	ES1(5) [5]	NME-1 (2) [2]	SBS5(2) [2]	30	24
VI	CS15(5) [5]	CS16(6) [4]	CS17(5) [3]	ES2(5) [5]	ES3(5) [5]	NME-2 (2) [2]	SBS6(2) [2]	30	26
							Extension Activity		1
							TOTAL CREDITS		140

( ) – Number of Hours　　　　　　　　**[ ] – Number of Credits**

T	-	Tamil	**E**	-	English
CS	-	Core Subject	**AS**	-	Allied Subject
SBS	-	Skill Based Subject	**NME**	-	Non Major Elective
ES	-	Elective Subject	**VE**	-	Value Education
EVS	-	Environmental Studies	**EA**	-	Extension Activities

SEMESTER I

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
1	T1	Tamil	6	3	25	75	100
2	E1	English	6	3	25	75	100
3	CS1	Programming in C++	4	4	25	75	100
4	CS2	Lab1: Programming in C++	6	4	40	60	100
5	AS1	Mathematical Foundations I	4	4	25	75	100
6	SBS1	Lab2: Basic Drawing and Designing	2	2	40	60	100
7	VE	Value Education	2	2	25	75	100
		Total	30	22			

SEMESTER II

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
1	T2	Tamil	6	3	25	75	100
2	E2	English	6	3	25	75	100
3	CS3	Programming in Java	4	4	25	75	100
4	CS4	Lab3: Programming in Java	6	4	40	60	100
5	AS2	Mathematical Foundations II	4	4	25	75	100
6	SBS2	Lab4: Graphic Designing (Photoshop)	2	2	40	60	100
7	EVS	Environmental Studies	2	2	25	75	100
		Total	30	22			

SEMESTER III

S. No	CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
1	T3	Tamil	6	3	25	75	100
2	E3	English	6	3	25	75	100
3	CS5	Data Structures and Computer Algorithms	4	4	25	75	100
4	CS6	Multimedia Systems	4	4	25	75	100
5	CS7	Lab 5: Multimedia Systems-Adobe Illustrator	4	3	40	60	100
6	AS3	Resource Management Techniques	4	4	25	75	100
7	SBS3	Lab 6: 2D Animation (Flash)	2	2	40	60	100
		Total	30	23			

SEMESTER IV

S. No	CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
1	T4	Tamil	6	3	25	75	100
2	E4	English	6	3	25	75	100
3	AS4	Numerical Methods	4	4	25	75	100
4	CS8	Computer Graphics	4	4	25	75	100
5	CS9	Lab 7: Video – Audio Editing tools	4	3	40	60	100
6	CS10	Lab 8: Scripting and Storyboarding for Animation and Games	4	3	40	60	100
7	SBS4	Lab 9: Python Programming (Game designing)	2	2	40	60	100
8	EA	Extension Activities		1	100		100
		Total	30	23			

SEMESTER V

S.No	CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
1	CS11	Open source Technologies	5	4	25	75	100
2	CS12	Operating System	5	4	25	75	100
3	CS13	Lab 10: 3D Modelling and Texturing	6	4	40	60	100
4	CS14	Lab 11: Open Source Technology- Php | Mysql	5	3	40	60	100
5	ES1	1. Client Server Computing 2. Android Programming 3. Mobile Computing	5	5	25	75	100
6	NME 1	Drawing and Visual Art	2	2	25	75	100
7	SBS5	Lab12: 3D Lighting and Rendering	2	2	40	60	100
		Total	30	24			

SEMESTER VI

S No	CODE	Subject	Hours	Credits	Internal Marks	External Marks	Total Marks
1	CS15	Data Communication and Computer Networks	5	5	25	75	100
2	CS16	Lab13: Game Designing and Development	6	4	40	60	100
3	CS17	Lab 14: Visual effects	5	3	40	60	100
4	ES2	1. Software Engineering 2. Rendering Techniques 3. Web Graphics and Games	5	5	25	75	100
5	ES3	Project Work / Viva-Voce	5	5	25	75	100
6	NME 2	Film Analysis	2	2	25	75	100
7	SBS6	Quantitative Aptitude	2	2	25	75	100
		Total	30	26			

Non-Major Elective Courses are applicable other than B.Sc. Computer Science (Animation and Game Designing) students.

Scheme of Examination /Question Paper Pattern / Scheme of Evaluation

Theory Subjects: **Internal Evaluation- parameters**

Internal Test   - 10 Marks
Assignment   - 5 Marks
Quiz   - 5 Marks
Peer- Peer/ seminar/
Group Discussion   - 5 Marks

Total   - 25 Marks

External Evaluation Pattern- Question Paper Pattern

Time: 3 Hours	**Max. Marks: 75**

Part – A
Answer all the questions   **(10*1=10)**
Ten Questions, two questions from each Unit: *Multiple Choice Questions*

Part – B
Answer all the questions   **(5*7=35)**

Five Questions, one question set from each Unit: *Either …Or…type*

Part – C
Answer any three questions   **(3*10=30)**

Five Questions, one question from each Unit

Practical Subjects:

A candidate has to prepare Algorithm / Procedure for both the questions covering both the parts. The following list of parameters is taken into account for the evaluation of practical examination.

Total Marks: 100 (Internal: 40 marks, External: 60 Marks)

Parameters

For Internal Marks:

i.	Average of two tests:	25
ii.	Record Work:	10
iii.	Seminar / Quiz /Viva:	5
	Total:	**40**

For External Marks:

    i.   Aim, Procedure / Algorithm and Program: 15
    ii.   Coding and Compilation: 10
   iii. Debugging: 15
   iv. Results :   10
    v.   Viva: 10
        Total: **60**

Note: The External Examiner can fix other exercises also other than those found in the list(Syllabus)in consultation with the Internal Examiner without violating the scope of the prescribed syllabus.

For Project Work:

The combined project shall be undertaken by the students as a team of two. The project should be done in the college lab. The following list of parameters is taken into account for the evaluation of Project work and Viva-voce.

Total Marks: 100 (Internal: 25 marks, External: 75 Marks)

Parameters:

For Internal Marks: Two review meetings : 2 x 7.5 = 15Marks
Overall Performance   :   = 10 Marks
For External Marks: Project Report   :   = 25 Marks
Project Demo & Presentation   :   = 30 Marks
Viva-Voce   :   = 20Marks

Detailed Syllabus
CS1 Programming in C++
(4 Hours - 4 credits)

Unit I:

Software Crisis – Software Evolution – Basic Concepts of Object-Oriented Programming – Benefits of OOP – Object-Oriented Languages - Applications of OOP – Application of C++ - Structure of a C++ Program – Tokens – Keywords – Identifiers – Basic Data Types – User-defined Data types – Derived data types – Symbolic constants – Type compatibility – Declaration of variables – Dynamic initialization of variables –Reference variables – Operators in C++ - Manipulators. Type cast operator – Expressions and their types-Implicit conversions – Control structures – The main function – Function prototyping – inline functions – Function overloading.

Unit II:

Specifying a class – Defining member functions – Making an outside function inline – Nesting of member functions – Private member functions – Array within a class – Memory allocation for objects – Static data members – Static member functions – Array of objects - Objects as function arguments –Friendly functions

– Returning objects – Constant member functions – Constructors – Parameterized constructor – Multiple constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy constructor – Destructors.

Unit III:

Defining operator overloading – Overloading unary operators – Overloading binary operators

Overloading binary operators using friend function – Rules for overloading operators - Defining derived classes – Single inheritance – Making a private member inheritable – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance

Virtual base classes – Constructors in derived class – Member classes: Nesting of classes.

Unit IV:

Pointer to objects – this pointer – Pointers to derived classes – Virtual functions – Pure virtual functions – C++ Stream classes – Unformatted I/O operations – Managing output with manipulators.

Unit V:

Classes of file stream operations – Opening and Closing files – Detecting end of file – More about open() function – File modes, File pointers and their manipulation – Sequential input and output operations – Command-line arguments- Templates: class templates and function templates.

Text Book:

1. Object Oriented Programming with C++, E. Balagurusamy, Sixth Edition-2013, McGraw Hill Education (India) Private Limited, New Delhi.

Unit I	: Chapter1(Except1.3,1.4), Chapter2 (Only), Chapter3 (Except3.20,3.21,3.22), Chapter 4
Unit II	: Chapter 5 (Except 5.18, 5.19), Chapter 6(Except6.8, 6.9, 6.10)
Unit III	: Chapter 7, Chapter 8 Unit IV : Chapter 9, Chapter10
UnitV	: Chapter 11 (Except 11.8), Chapter 12 (Only 12.2, 12.3 and 12.4)

Reference Books:

1. C++ - The Complete Reference, Herbert Schildt, TMH, 1998.

2. C++ How to Program, Paul Deitel, Harvey Deitel, PHI, Ninth edition (2014).

3. Ashok N.Kamthane, Object Oriented Programming with ANSI & Turbo C++, Pearson Education, 2006.

4. Object-Oriented Programming With C++, Poornachandra Sarang, 2nd Edition, PHI Learning Private Limited, New Delhi, 2009.

5. Object-Oriented Programming Using C++, Alok Kumar Jagadev, Amiya Kumar Rath and Satchidananda Dehuri, Prentice-Hall of India Private Limited, New Delhi, 2007.

CS2: Lab 1: Programming in C++
(6 Hours - 4 credits)

Exercises:

Section A
1. Printing Prime numbers between two given numbers.
2. Printing 3 digit numbers as a series of words. (Ex. 543 should be printed out as Five Four Three).
3. Finding area of geometric shapes using function overloading.
4. Inline functions for simple arithmetic operations.
5. Demonstrating the use of Pre-defined Manipulators.
6. Demonstrating the use of friend function.
7. Creating student mark list using array of objects
8. Demonstrating constructor overloading.
9. Overloading the unary –operator.
10. Demonstrating single inheritance.
11. Demonstrating the use of this pointer.
12. Designing our own manipulator.
13. Illustrating function templates.
14. Illustrating class templates.

Section B
1. Overloading the binary +operator.
2. Demonstrating Multiple inheritance.
3. Demonstrating Multilevel inheritance.
4. Demonstrating Hierarchical inheritance.
5. Demonstrating Virtual functions.
6. Processing mark list using binary file.
7. Count number of objects in a file.
8. Demonstrating the use of Command-line arguments.

AS 1: Mathematical Foundations I

(4 Hours – 4 Credits)

Unit I:

The Foundations: Logic and Proofs: Propositional logic – Applications of Propositional logic – Propositional equivalences – (Exclude Propositional satisfiability, Applications of satisfiability, Solving satisfiability problems, and its related problems) – Predicates and Quantifiers – Rules of inference.

Unit II:

Relations: Relations and their properties – Representing relations – Closures of relations – Partial orderings (Theorems statement only; Exclude lexicographic ordering - Exclude Lattices)

Unit III:

Counting: The basic of counting - The pigeonhole principle – Permutation and Combinations – Applications of recurrence relations – Solving recurrence relations – Divide and Conquer algorithms and recurrence relations. (All theorems and Results statement only)

Unit IV:

Graphs: Graphs and Graphs models, (Excluding Biological networks; Tournaments; all its related examples and problems) – Graph terminology and special types of graphs – Representing graphs and Graph isomorphism – Connectivity (paths – connectedness in undirected graphs – paths and isomorphism – counting paths between vertices) – shortest path problems.

Unit V:

Matrices: Introduction – operations – inverse – Rank of a matrix, solution of simultaneous linear equations – Eigen values and Eigen Vectors.

Text Books:

1. Discrete Mathematics and its applications, Seventh Edition, Kenneth.H.Rosen, McGrawHill Publishing Company,2012.

2. Discrete Mathematics, M.Venkataraman, N.Sridharan and N.Chandrasekaran, The National Publishing Company,2009.

Unit I	:	Textbook 1	Chapter 1: Sections: 1.1, 1.2, 1.3, 1.4, 1.6
Unit II	:	Textbook 1	Chapter 9: Sections: 9.1, 9.3, 9.4, 9.5, 9.6
Unit III	:	Textbook 1	Chapter 6: Sections: 6.1, 6.2, 6.3
			Chapter 8: Sections: 8.1, 8.2, 8.3 (Pages: 527 -529 only)
			(Exclude algorithms and relations, on page 507 and its related problems)

Unit IV   : Text book 1   Chapter 10: Sections: 10.1, 10.2, 10.3, 10.4,
                             10.6)
Unit V   : Text book 2   Chapter 6 :Sections :6.1 to 6.5, and 6.7)

Reference Books:

1. Modern Algebra - S.Arumugam and A. Thangapandi Isaac, Scitech publications2005.

2. Invitation to Graph Theory-S.Arumugam and S.Ramachandran,Scitech Publications,2005,Chennai.

3. Discrete Mathematical Structures with applications to Computer Science - Tremblay and Manohar, McGrawHill,1997.

SBS1-Lab2: BASIC DRAWING AND DESIGNING
(2 Hours 2 Credits)

Objectives:
- To draw from observation
- To use different shapes
- To use line as the principle conveyor of form

Exercises:
1) Draw types lines
2) Draw types of dots
3) Draw types of shades
4) Practicing shade for a drawing
5) Practicing with different colour pencils
6) One point perspective drawing
7) Two point perspective drawing
8) Three point perspective drawing
9) Interior perspective Drawing
10) Exterior perspective Drawing
11) Colour drawings
12) Drawing pattern and texture
13) Pen and Ink drawing
14) Anatomy drawing
15) Still life drawing

Reference Books:

1. Garcia, C. W. (2003). Drawing for the absolute and utter beginner. Watson-Guptill.
2. Dodson, B. (1990). Keys to drawing. North Light Books.
3. Edwards, B. (1997). *Drawing on the Right Side of the Brain*(pp. 188-189).ACM.

CS3: Programming in Java

(4 Hours – 4 Credits)

Unit I: Fundamentals of Object – Oriented Programming

Object Oriented paradigm, Basic Concepts of OOP, Benefits of OOP, Applications of OOP, Java features: **OVERVIEW OF JAVA LANGUAGE:** Introduction, Simple Java program structure, Java tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command line arguments. **CONSTANTS, VARIABLES & DATA TYPES:** Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Scope of variables, Symbolic Constants, Type casting, Getting Value of Variables, Standard Default values; **OPERATORS & EXPRESSIONS**.

Unit II: Decision Making & Branching

Introduction, Decision making with if statement, Simple if statement, if. Else statement, Nesting of if. else statements, the else if ladder, the switch statement, the conditional operator. **DECISION MAKING & LOOPING**: Introduction, The While statement, the do-while statement, the for statement, Jumps in loops.

CLASSES, OBJECTS & METHODS: Introduction, Defining a class, Adding variables, Adding methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of methods;

Unit III: Inheritance

Extending a class, Overloading methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes; arrays, strings and vectors: Arrays, One-dimensional arrays, Creating an array, Two – dimensional arrays, Strings, Vectors, Wrapper classes Interfaces: multiple inheritance: Introduction, Defining interfaces, Extending interfaces, Implementing interfaces, Assessing interface variables.

Unit IV: Multi threaded Programming

Introduction, Creating Threads, Extending the Threads, Stopping and Blocking a Thread, Lifecycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface. MANAGING ERRORS AND EXCEPTIONS: Types of errors : Compile-time errors, Runtime errors, Exceptions, Exception handling, Multiple Catch Statements, Using finally statement.

Unit V: Packages

Introduction, Java API Packages, Using System Packages, Naming conventions, Creating Packages, Accessing a Package, using a Package. Managing input/output files in java: Introduction, Concept of Streams, Stream classes, Byte Stream Classes, Input Stream Classes, Output Stream Classes, Character Stream classes: Reader stream classes, Writer Stream classes, Using Streams, Reading and writing files.

Text Book:

Programming with JAVA, A Primer,E.Balagurusamy,5th Edition, McGraw-Hill Company,2015

Unit I	:	Chapters 1 -5
Unit II	:	Chapters 6 ,7 and8.1-8.10
Unit III	:	Chapter 8.11-8.18, Chapters 9 and10
Unit IV	:	Chapter 12 and13
Unit V	:	Chapter 14,11.1-11.7 and16

Reference Books:

1. Programming in Java, Sachin Malhotra, Oxford University Press 2.Programming with Java, John R. Hubbard, Second Edition, Schaum's outline.

2. Series, Tata McGraw-Hill Company.

3. Java TM: How to Program, Deitel & Deitel, PHI, 2007

4. Java 2- The Complete Reference, Herbert Scheldt , 5th Edition, McGraw Hill Education (India) Private Limited, 2002.

CS4: Lab 3: Programming in Java
(6 Hours – 4 Credits)

Exercises:

Section: A
Write Programs in Java for the following:
1. To implement a simple temperature conversion program.
2. To perform addition and subtraction of complex numbers using class and objects.
3. To perform volume calculation using method overloading.
4. Using command line arguments, test if the given string is palindrome or not.
5. String manipulation using String Methods (Use of any five String methods are preferred).
6. Write a program to fill names into a list. Also, copy them in reverse order into another list. If the name contains any numeric value throw an exception Invalid Name.

7. Program to demonstrate the use of any two built-in exceptions in Java.

Section: B

1. To perform multiplication of matrices using class and objects.
2. Using multilevel inheritance process student marks.
3. Implement multiple inheritance for payroll processing.
4. Implement interface for area calculation for different shapes.
5. Create a package called Arithmetic that contains methods to deal with all arithmetic operators. Also write a program to use the package.
6. Create two threads such that one of the thread generate Fibonacci series and another generate perfect numbers between two given limits.
7. Define an exception called **: Marks Out of bound:** Exception, that is thrown if the entered marks are greater than100.
8. Program to demonstrate the use of Wrapper class methods.
9. File Processing using By testream.
10. File Processing using Character Stream.
11. Write applets to draw the following Shapes:
12. **(a).** Cone **(b).** Cylinder **(c).** Square inside a Circle **(d).** Circle inside a Square.
13. Write an applet Program to design a simple calculator.
14. Write an Applet Program to animate a ball across the Screen.

AS2: MATHEMATICAL FOUNDATIONS II
(4 Hours – 4 Credits)

Unit I:

Introduction to statistics – primary and secondary data – classification, tabulation and Diagrammatic Representation of statistical data – Bar-charts, Pie-diagrams' – Graphical Representation of data – Histograms, Frequency polygon, Ogives.

Unit II:

Measures of dispersion – characteristics – coefficient of dispersion - Coefficient of variation.

Moments – skewness and kurtosis – Pearson's coefficient of skewness - Bowley's coefficient of Skewness – Coefficient of skewness based upon moments.

Unit III:

Simple correlation – Karl Pearson's coefficient of correlation – correlation coefficient for A bivariate frequency distribution – Rank correlation – Regression lines of regression – Properties of regression coefficient.

Unit IV:

Events and sets – sample space – concept of probability – addition and multiplications Theorem on probability – conditional probability and independence of evens – Baye's Theorem – concept of random variable – Mathematical Expectation.

Unit V:

Concept of sampling distributions – standard error – Tests of significance based on t, Chi- square and F distributions with respect to mean, variance.

Text Book:

1. Statistical Methods, S.P.Gupta, Sultan chand and sons, 2004.

Unit I	:	Chapters 1, 2.2, 2.2.1, 2.2.2, 2.2.3 – 2.2.5
Unit II	:	Chapters 7 and 8
Unit III	:	Chapters 9, 9.1, 9.2, 9.3, 10, 10.1, 10.2, 10.2.1, 10.2.2, 10.2.3, 10.3
Unit IV	:	Chapter 16
Unit V	:	Chapters 18.3, 18.4, 18.7.1, 18.7.2, 19

Reference Books:

1. Statistics, Dr. S.Arumugam and A.Thangapandi Issac, New Gamma Publication house, 2002.

2. Kishor S. Trivedi - Probability and statistics with reliability queuing and Computer Science Applications - Prentice Hall of India(P) Ltd., New Delhi - 1997.

3. Discrete Mathematics - Seymour Lipschutz, Marc Lars Lipson Schaum's Outlines- by, 3rd Edition., Tata McGraw Hill, Education Pvt. Ltd., New Delhi. 5th Reprint2012.

SBS2: Lab 4: Graphic Designing (Photoshop)
(2 Hours – 2 Credits)

Objectives:

- To impart knowledge about Graphic Design and its applications.
- To impart practical exposure of using Photoshop's various tools and techniques.
- To know about different types of layers and its blending options.
- To know about Photoshop filters, Digital painting, and different text styles and formats.

Exercises:

1) Getting Acquainted with Photoshop interface
2) Understanding of vector and raster graphics
3) Learning about Tools and shortcuts
4) Understanding Bitmap image, vector image, image resolution settings
5) Practicing with different file formats JPEG, GIF, TIF, PSD, PNG etc.
6) Practice with clone stamp tool
7) Practice with spot healing brush tool
8) Practice with Healing brush and Patch tool
9) Layout Designing
10) Learning types of masking and channels
11) Practicing with layers and blending modes.
12) Practicing with filters
13) Understanding Colour Values
14) Colour grading of a picture
15) File exporting

Reference Books:

1. The Hidden Medium of Communication (Design Fundamentals) - Peter Bonnici, Publisher: Rotovision, March 1, 1999.

2. Principles of Form and Design - Wucius Wong - Publisher: John Wiley & Sons, New York2, September 15, 1993.

3. Principles of Color Design - Wucius Wong - Publisher: Wiley, September 26, 1996.

CS5: Data Structures and Computer Algorithms
(4 Hours - 4 credits)

Unit I:

Introduction and Overview – Introduction – Basic Terminology; Elementary Data Organization – Data Structure Operations – Complexity of Algorithms – Other Asymptotic Notations for Complexity of Algorithms.

Arrays – Introduction – Linear Arrays – Representation – on Linear Arrays in Memory – Traversing Linear Arrays – Inserting and Deleting – Sorting: Bubble Sort – Searching; Linear Search – Binary Search – Multidimensional Arrays. Linked List – Introduction – Linked Lists – Representation of Linked Lists in Memory – Traversing a Linked List – Memory Allocation; Garbage Collection – Insertion into a Linked List – Deletion from a Linked list.

Unit II:

Stack: Introduction – Stacks – Array Representation of Stacks – Linked Representation of Stacks – Recursion - Tower of Hanoi - Implementation of Recursive Procedures by Stacks - Queue –Linked Representation of Queues – D – Queue

Unit III:

Trees – Introduction – Binary Trees – Representing Binary Trees in memory – Traversal Binary Tree – Traversal algorithms using Stacks – Header Nodes; Threads – Binary Search Trees – Searching and Inserting in Binary Search Trees
Deleting in a Binary Search Trees.
Graphs – Introduction – Graph Theory - Terminology – Sequential Representations of Graph
Adjacency Matrix; Path Matrix – Warshall's Algorithm; Shortest Paths.

Unit IV:

Algorithms: Introduction: What is an Algorithm? – Algorithm Specification – Performance Analysis – Divide and Conquer: General method – Binary Search – Finding the maximum and minimum – Merge Sort – Quick Sort – Selection – Strassen's Matrix Multiplication.

Unit V:

The Greedy Method: General Method – Knapsack problem – Job Sequencing with deadlines – **Minimum cost spanning trees:** Prim's Algorithm – Kruskal Algorithm – Optimal Storage on tapes – Optimal merge patterns – single source shortest path.

Text Books:

1. Data Structures – Seymour Lipschutz –Tata McGraw-Hill -2006
2. Fundamentals of Computer Algorithms, Ellis Horowitz, SartajSahni, Galgotia Publications Pvt. Ltd, New Delhi.

Unit I : Textbook 1		Chapter 1 (1.1 to 1.4) , Chapter 2 (2.5 , 2.6), Chapter (4.1 to 4.9), Chapter 5 (5.1 to 5.8)
Unit II : Textbook 1		Chapter 6 (6.1 to 6.4, 6.7 to 6.12)
Unit III : Textbook 1		Chapter 7 (7.1 to 7.9)
UnitIV : Textbook 2		Chapter 1 (Except 1.4), Chapter 3 (Except 3.2, 3.9)
Unit V : Textbook 2		Chapter 4 (Except 4.2, 4.6.3)

Reference Books:

1. Data Structure and Algorithm Analysis in C – Mark Allen Weiss – Second Edition, Addison Wesley publishing company,1997.
2. C and C++ Programming Concepts and Data Structures -P.S.Subramanyam –
3. BS Publications, 2013.
4. Data Structures and Algorithms- Alfred V.Aho, John E.Hopcraft and Jeffrey D.Ullman - Pearson Education - Fourteenth Impression -2013.

CS 6: Multimedia Systems
(4 Hours – 4 Credits)

Objectives:

- To understand the concepts about the signal processing exploited in the field of multimedia applications.
- To understand the basic tools involved in Multimedia

Unit I: Digital Signal Processing

Waveforms, Amplitude, Frequency and Phase. Signal to Noise ratio and Decibel Scales. Signal Flow Graphs, Digital Signal Filtering, Finite Impulse Response, Fourier Transform, Frequency components of Audio and Video Data.

Unit II: Multimedia Data

Discrete and Continuous Media, Analog and Digital Signals: Analog/Digital Converter, Text and Static Data, Audio: digitising Sound, Graphics, Images and Video, Digital Sampling: Nyquist's theorem

Unit III: Digital Audio: MIDI and MPEG-4

Nyquist Sample Rate and Bit Size, MIDI: definition, components, hardware aspects, Messages, Channels, Structured Audio, MIDI Semantics and Control, Common Digital Audio Formats.

Unit IV: Graphics, Images and Videos

Graphic/Image File Formats: 24-bit and 8-bit colors, BitMaps, Gray Scale and Dithering, Graphic Formats: GIF, JPEG, TIFF, PNG, EPS. RGB and CMY Color Models, Chrominance, Luma, Luminance and Gamma Correction. Color Vision: Photoreceptors, Cone Sensitivity and Color Properties, Color Video Signals: NTSC and PAL.

Unit V: JPEG

Basic JPEG Compression Framework, Major Coding Algorithms, Quantization, Zig-zag Scan, Differential Pulse Code Modulation, Run Length Encode, Huffman Coding, Artifacts and Gibb's Phenomenon

Reference Books:

1. Fundamentals of Multimedia: *Ze-Nian Li & Mark S. Drew*, Pearson Prentice Hall, 2004.
2. Digital Signal Processing: *Steven W. Smith*, California Technical Publishing, 1999.
3. Digital Signal Processing System-Level Design Using LabVIEW: *Nasser Kehtarnavaz & Namjin Kim*, Elsevier, 2005.

4. Digital Signal Processing: a Filtering Approach: *Steve White*, Delmar Cengage Learning, 2000.

5. Design of Digital Filters: *J. Fessler*, excerpt from lectures, 2004.

6. Digital Filters: *SaeedVaseghi*, excerpt from "Multimedia Signal Processing: Theory and Applications in Speech, Music and Communications", 2007, Wiley publisher.

7. Introduction to Data Compression: *Guy E. Blelloch*, excerpt from "Algorithms in the Real World", 2001.

8. Introduction to Nuclear Magnetic Resonance Imaging: *J. Fessler*, excerpt from lectures, 2009.

CS-7 LAB-5: Multimedia Systems – Adobe Illustrator
Hour per Week: 4 - Credits: 3

Objectives:
- Build upon the concepts introduced in Graphic Design and prepare the student to successfully meet the challenges of Graphic Design
- Complete exploratory projects in design theory and practice, which may be used to develop a presentation portfolio of personal work.
- Develop an understanding of 2D animation characters

Exercises:
1) Practicing with Illustrator Interface
2) Learning pen tool and transform options
3) Learning Brush tools
4) Creating custom symbols
5) Creating Logo
6) Understanding Primary, Secondary and Tertiary colour measurements
7) Filters usage for vector graphics
8) Designing a Business card
9) Designing a Letter head
10) Designing a newspaper Advertisement
11) Designing a 2D Character
12) Designing Character Actions
13) Creating Head and Neck
14) Creating Upper Torso
15) Creating Lower Torso
16) Creating the Hips, arms and legs
17) Designing a front view of 2D human character
18) Learning joints of Character
19) Designing a profile view of 2D human character
20) Story board sketching practice

Reference Books:

1. Learn Adobe Illustrator CC for Graphic Design and Illustration - Dena Wilson and Peter Lourekas with Rob Schwartz

2. Producing Independent 2D Character Animation_ Making & Selling A Short Film (Visual Effects and Animation Series) (Focal Press Visual Effects and Animation)

AS3: Resource Management Techniques

(4 Hours – 4 Credits)

Unit I:

Development of OR: Definition of OR – Modeling - Characteristics and Phases - Tools, Techniques & Methods - scope of OR.

Unit II:

Linear Programming Problem: Formulation - Slack & surplus variables- Graphical solution of LPP.

Unit III:

Simplex Method: Computational Procedure - Big-M method - Concept of duality in LPP - Definition of primal dual problems - General rules for converting any primal into its dual.

Unit IV:

Duality Theorems: (without proof) Primal dual correspondence - Duality and Simplex method - Mathematical formulation of assignment problem - Method for solving assignment problem.

Unit V:

Mathematical formulation of Transportation Problem: Methods for finding IBFS for the Transportation Problems.

Text Book:

Operations Research, S.D.Sharma, KedarNath Ram Nath& Co.

Unit I	:	Chapter-1(1.1, 1.2, 1.4,1.,1.8,1.9,1.10,1.11)
Unit II	:	Chapter-3 (3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.4,3.5)
Unit III	:	Chapter-5 (5.1, 5.2, 5.2.1, 5.3,5.4,5.5.4)Chapter- 7 (7.1,7.2,7.3,7.4)
Unit IV	:	Chapter-7 (7.5) (Statements only); 7.6, 7.7Chapter 11(11.2,11.3,11.4)
Unit V	:	Chapter-12 (12.2 to 12.8)

Reference Books:

1. Operation Research, Nita H.Shah, Ravi M.Gor and Hardiksoni,Prentice- Hall of India Pvt. Ltd., New Delhi2008.

2. Operation Research, R.Sivarethinamohan, Tata McGraw Hill, 2005. 3.Operations Research – An Introduction by HamdyA.Taha. NinthEdition,Dorling Kindersley Pvt. Ltd., Noida, India, 2012.

SBS3: Lab6: 2D ANIMATION (Flash)
(2 Hours –2 Credits)

Objectives:

- To familiarize the students with various approaches, methods and techniques of Animation Technology.
- To develop competencies and skills needed for becoming an effective Animator.
- To mastering traditional & digital tools to produce stills and moving images.
- To enable students to manage Animation Projects from its Conceptual Stage to the final product creation.
- To train students in applying laws of human motion and psychology in 2-D characters.

Exercises:

1) Creating a character in Adobe flash
2) Creating Cartoon environment and prop designing
3) Understanding timeline and Frame by frame animation
4) Learning Tween animation technique
5) Building animatic technique
6) Learning Bone tool for animation
7) Learning Walk cycle and run cycle for 2 legs and 4 legs character
8) Understanding Types of Camera views
9) Understanding Camera moments
10) Learning Lip synchronization of a character
11) Learning motion presets
12) Understanding Special effects such as fire, water and smoke
13) Working with audio interface
14) Practicing Action scripting
15) Exporting video files

Reference Books:

1. Hollywood 2D Digital Animation: The New Flash Production Revolution - Sandro Corsaro, Clifford J. Parrott (Author) 2004 by New Riders Publishing.
2. The Animator's Survival Kit: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Internet Animators Paperback – Illustrated, September 25, 2012
3. by Richard Williams
4. Sketching for Animation: Developing Ideas, Characters and Layouts in Your Sketchbook, April 21, 2016, by Peter Parr
5. REFERENCE BOOKS:
6. Animation: The Mechanics of Motion - Chris Webster (Author) 2005 Focal Press.
7. The Illusion of Life: Disney Animation Hardcover – Illustrated, October 19, 1995
8. by Ollie Johnston (Author), Frank Thomas (Author)
9. Character Animation Crash Course!(DVD not included) Paperback – July 15, 2008
10. by Eric Goldberg (Author)

AS4: Numerical Methods
(4 Hours – 4 Credits)

Unit I:

Algebraic and Transcendental Equations: Errors in numerical computation- Iteration method-Bisection method-Regula-Falsi method-Newton-Raphson method-Horner's method.

Unit II:

Simultaneous Equations: Introduction-Simultaneous equations-Back substitution-Gauss Elimination method-Gauss –Jordan Elimination method- Calculation of Inverse of a matrix- Crout's method-Iterative methods-Gauss- Jacobi Iteration method-Gauss seidal Iteration method-Newton Raphson's method for simultaneous equations.

Unit III:

Interpolation & Introduction: Newton's interpolation Formulae-Central difference Interpolation formulae-Gauss forward, Gauss backward, Lagrange's interpolation formulae- Divided differences-Newton's divided difference formula-Inverse Interpolation.

Unit IV:

Numerical Differentiation and Integration: Introduction-Derivates using Newton's forward difference formula-Derivates using Newton's backward difference formula-Numerical Integration-Newton-cotes quadrature formula- Trapezoidal Rule-Simpson's one third rule-Simpson's 3/8 th rule.

Unit V:

Numerical Solution of Ordinary Differential Equations: Introduction-Taylor series method-Picard's method-Euler's method-Runge-kutta method of second, third, fouth order- Predictor & corrector methods-Mile's method.

Text Book:

Numerical Methods, Second Edition, S.Arumugam, A.ThangapandiIssac, A.Somasundaram, SCITECH publications, 2009.

Unit I	:	Chapter-3
Unit II	:	Chapter-4 (excluding Relation method and its related problems)
Unit III	:	Chapter-7 (Sections: 7.0, 7.1, 7.2((i), (ii) and related problems); 7.3,7.4,7.5,7.6)
Unit IV	:	Chapter-8 (Sections: 8.0,8.1,8.2 related problems, 8.5 (excluding Weddles rule, Booles rule, Romberg's method and related problems))
Unit V	:	Chapter-10 (Sections : 10.0,10.1,10.2,10.3(excluding modified Euler's method & its related problems) 10.4,10.5,10.6)

Reference Books:

1. Mathews J.H. Numerical Method for Maths, Science and Engineering; PHI, New Delhi,2001.

2. Iqbal H. Khan & Q. Hassan Numerical Methods for Engineers and Scientist - Galgotia Publications (P) Ltd., New Delhi -1997.

3. M.K. Jain, S.R.K. Iyengar & R.K.Jain - Numerical Methods for Scientific and Engineering Computation - New Age International(P) Ltd., New Delhi -1996

CS8: Computer Graphics

(4 Hours – 4 Credits)

Unit I:

Overview of Graphics Systems: Video Display Devices–Raster Scan Systems–Random Scan Systems–Input Devices. Output Primitives: Points and Lines–Line Drawing Algorithms – Circle Generating Algorithms – Ellipse Generating Algorithms –Filled Area primitives.

Unit II:

Attributes of Output Primitives: Line Attributes – Curve Attributes – Color and Gray Scale Levels – Area Fill Attributes –Antialiasing. Two–Dimensional Geometric Transformations: Basic Transformations–Matrix Representations–Composite Transformations–Other Transformations –Transformations Between Coordinate Systems.

Unit III:

Two–Dimensional Viewing: The Viewing Pipeline–Viewing Coordinate Reference Frame – Window –to- Viewport Coordinate Transformation – Two-Dimensional Viewing Functions – Clipping Operations – Point Clipping – Line Clipping – Polygon Clipping– Curve Clipping– Text Clipping– Exterior Clipping.

Unit IV:

Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring. Color models – XYZ-RGB-YIQ-CMY-HSVModels

Unit V:

Multimedia communication systems – Multimedia Information Retrieval – Video conferencing– Virtual reality

Text Books:

1. Hearn Dand Baker M.P, "Computer graphics–C Version", 2nd Edition, Pearson Education, 2004. (For Units 1to3).
2. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications and Applications", Pearson Education, 2004. (For Units 4 and 5).

Reference Books:

1. Computer Graphics, Multimedia and Animation – Malay K. Pakhira, Prentice Hall of India Pvt. Ltd., New Delhi– 2008.

2. Fundamentals Of Computer Graphics And Multimedia – D. P. Mukherjee, Prentice Hall of India Pvt. Ltd., New Delhi–1999.

3. Siamon J. Gibbs, Dionysios C. Tsichritzis, "Multimedia programming", AddisonWesley, 1995.

CS09: Lab7: Video – Audio Editing Tools
(4 Hours – 3 Credits)

Objectives:

- To know the fundamentals of Audio & video editing techniques and technology.
- To know the components and procedures of the edit room workflow.
- To give exposure in edit decision making process.
- To give exposure in nonlinear edit suites.
- To give exposure in adobe premiere software.

Exercises:

1) Learning interfaces of Adobe Premiere.
2) Practicing project settings.
3) Learning File management technique (logging).
4) Learning timeline parameters.
5) Learning short cut keys.
6) Importing videos and Shot selections.
7) Practicing sequence editing.
8) Practicing continuity editing.
9) Learning cut in cut away techniques.
10) Practicing Multi Track video editing.
11) Learning video transition effects.
12) Learning parallel Editing technique.
13) Learning L cut.
14) Learning J cut.
15) Learning Montage editing.
16) Learning audio interface in timeline.
17) Practicing with dubbing tracks, audio effects and BGM.
18) Practicing Audio Mixing.
19) Practicing titling.
20) Exporting Videos.

Reference Books:

1. Diana Weynand, publisher- Peachpit Press; 1 edition (August 21, 2009).

2. The Grammar of Edit – Thompson-Focal press.

3. Adobe premiere pro cc for graphics designing and motion graphics paperback – large print, September 23, 2019, By mark myers.

CS10: Lab 8: Scripting and Storyboarding for Animation and Games
(4Hours – 3 Credits)

Objectives:

- To learn script writing for an animation short stories
- To learn Shot divisions
- To learn Storyboarding technique for shots

Exercises:

PART A- Scripting
1. Story Ideation for animation short films and Games.
2. Writing One line Story.
3. Writing Synopsis.
4. Writing detailed story.
5. Screenplay writing- Sequence, Scene and Shot divisions.
6. Writing technical script- Camera angles.
7. Writing technical script- Type of shots.
8. Writing technical script- Type of camera movements.
9. Learning Point of view shot.
10. Learning Objective shot.
11. Learning Subjective shot.

PART B- Story Boarding
1. Character Designing.
2. Background Designing (Nature).
3. Set Designing.
4. Property designing.
5. Designing Character placement.
6. Applying 180 degree rule.
7. Applying 30 degree rule.
8. Applying Frame Entry and Exit rule.
9. Perspective Drawing.

Reference Books:
1. Miller 2008 "Digital Story telling" Focal Press (Elsevier)
2. Sarkar 2008 "Art and Print production" Oxford University Press
3. The Analysis of Film by Raymond Bellour and Constance Penley (Editor).
4. How to Read a Film: Movies, Media, and Beyondby James Monaco.
5. Film Art: An Introduction - Paperback (Nov. 25, 2009) by David Bordwell and Kristin Thompson.
6. Film Form: Essays in Film Theory - Paperback (Mar. 19, 1969) by Sergei Eisenstein and Jay Leyda.

SBS4: Lab 9: Python Programming (Game Designing)
(2Hours - 2Credits)

Objective:

The objective of the course is to learn the Pygame module of python from scratch to understand and implement various parts of a game. These parts include designing fonts, background images, pixel coordination, primitive graphics, cartoon cursors, animation, input device recognition, etc.

Exercises:

Section A – Basic Python Programming

1) Write a program to find sum of digits using functions.

2) Write a program to find whether the given number is an Amstrong number or not.

3) Write a program that accepts a string from user and redisplays the same string after removing vowels from it

4) Write a program that randomly generates a number. Raise a user defined exception if the number is below 0.1.

5) Write a program to calculate number of days between two dates. *Sample dates* : (2014, 7, 2), (2014, 7, 11) *Expected output* : 9 days

6) Write a program to add two binary numbers.

7) Write a Python program for binary search.

8) Write a python program to count repeated characters in a string. Sample string: 'the quick brown fox jumps over the lazy dog' Expected output : o 4 e 3 u 2 h 2 r 2 t 2.

9) Write a program to draw a pattern of straight lines.

Section B

1) Installation instructions for python, anaconda, and Pygame packages. It continues to introduce the Jupiter notebook which would be an execution platform for this course.

2) Pygame basics with an introduction to display module, events, and loops, and pregame program.

3) More on Pygame functionalities include learning different primitive functions, graphics primitives, ellipse, setting up background colors with different lines, understanding pixel coordination, and Blit functions. This marks the end of the beginner section and promotes the learner to the intermediate level.

4) The intermediate section of the course brings more fun in learning with more exercises for.

Section C

1) Input device handling in games across various devices and their user inputs.

2) Image transformation techniques include loading, scaling, rotating, and flipping according to the requirement.

3) Image coding to generate custom images and to apply image transformation on the same. It also teaches essential operations like Laplacian transform, traverse, and re-center image.

4) Fonts section helps us create new fonts for our game or to reuse a font.

5) The cursor section deals with the creation of custom cartoon cursors in detail. It is an essential part of game programming which has been detailed with relevant projects.

6) Move image is an essential activity to start programming animation of objects.

7) Animation – Move and control objects programmatically. This section has been dealt with in detail with examples and puzzles to solve and learn.

Reference Books:

1. Parker J. Game Development Using Python 2ed 2021.

2. Coding Games for Python from DK Publishers.

CS11: Open source Technologies
(5 Hours- 4 Credits)

Objectives:

- To develop knowledge on dynamic objects, Graphical, Database objects used in Websites.
- To understand the advanced dynamic web pagedevelopment.
- To enable the learner for aiming careers in PHP Programming and content management.

Unit I: Basic Php

Web Server-Apache-PHP-Data Types-User defined Variables-Constants-Operators Control Structures-User defined Functions-Directory Functions-File system Functions-Arrays-String Functions-Date and Time Functions-Mathematical Functions-Miscellaneous Functions.

Unit II: Advanced PHP with Mysql

Exceptions handling-Error Handling Functions-Predefined Variables-Cookies Sessions-COMDOM-CURL-SOAP-Classes and Objects-Mail Function-URL Functions. PHP with MySQL: PHP My SQL Functions-Database driven application.

UNIT III: Advanced PHP with AJAX, SEO and CMS

PHP with AJAX: Introducing Ajax-Ajax Basics- PHP and Ajax-Database Driven Ajax. PHP with SEO: Basic SEO-Provocative SE Friendly URLs-Duplicate Content- CMS: Word press Creating an SE-Friendly Blog

UNIT IV: Basic Perl

Introduction-Scalar Data-Listsand Arrays-Subroutines-Input and Output-Hashes Regular Expressions-Control Structures-PerlModules-FileTests.

UNIT V: Advanced Perl

Directory Operations-Strings and Sorting-Smart Matching-Process Management Advanced Perl Techniques.

Text Books:

1. Mehdi Achour, Friedhelm, Betz Antony Dovgal, Nuno Lopes, Hannes Magnusson, Georg Richter, Damien Seguy, Jakub Vrana And several others, (1997-2011), "PHP Manual (Download the manual from PHP official website www.php.net)", The PHP Documentation Group. (For Units I to III).

2. Lee Babin, (2007), "Beginning Ajax with PHP From Novice to Professional", Apres.

Reference Books:

1. Jaimie Sirovich and Cristian Darie, (2007), "Professional Search Engine Optimization with PHP A Developer's Guide to SEO", Wiley Publishing, Inc., Indianapolis, Indiana.

2. RandalL. Schwartz,Tom Phoenix, briandfoy, "Learning Perl, Fifth Edition, 2009.

CS12: Operating System
(5 Hours- 4 Credits)

Unit I:

Introduction to Operating Systems: Introduction, What is an Operating systems, Operating system components and goals, Operating systems architecture. Process Concepts: Introduction, Process States, Process Management, Interrupts, Inter process Communication.

Unit II:

Asynchronous Concurrent Execution: Introduction, Mutual Exclusion, Implementing Mutual Exclusion Primitives, Software solutions to the Mutual Exclusion Problem, Hardware solution to the Mutual Exclusion Problem, Semaphores. Concurrent Programming: Introduction, Monitors.

Unit III:

Deadlock and Indefinite Postponement: Introduction, Examples of Deadlock, Related Problem Indefinite Postponement, Resource concepts, Four Necessary conditions for Deadlock, Deadlock solution, Deadlock Prevention, Deadlock Avoidance with Dijkstra's Banker's algorithm, Deadlock Detection, Deadlock Recovery.

Processor Scheduling: Introduction, Scheduling levels, Preemptive Vs Non-Preemptive Scheduling Priorities, Scheduling objective, Scheduling criteria, Scheduling algorithms.

Unit IV:

Real Memory Organization and Management: Introduction, Memory organization, Memory Management, Memory Hierarchy, Memory Management Strategies, Contiguous Vs Non-Contiguous Memory allocation, Fixed Partition Multi programming, Variable Partition multiprogramming.

Virtual Memory Management: Introduction, Page Replacement, Page Replacement Strategies, Page Fault Frequency (PFF) Page replacement, Page Release, Page Size.

Unit V:

Disk Performance Optimization: Introduction, Why Disk Scheduling is necessary, Disk Scheduling strategies, Rotational optimization.

File and Database Systems: Introduction, Data Hierarchy, Files, File Systems, File Organization, File Allocation, Free Space Management, File Access control.

Text Book:

Operating Systems, Deitel & Deitel Choffnes, Pearson education, Third edition, 2008.

Unit I	:	Chapter 1: 1.1, 1.2, 1.12, 1.13 & Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5
Unit II	:	Chapter 5: 5.1, 5.2, 5.3, 5.4(up to 5.4.2), 5.5, 5.6 & Chapter 6: 6.1, 6.2
Unit III	:	Chapter 7: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10
Chapter 8	:	8.1, 8.2, 8 3, 8.4, 8.5, 8.6, 8.7
Unit IV	:	Chapter 9: 9.1, 9 2, 9.3, 9 4, 9.5, 9.6, 9.8, 9.9
Chapter 11	:	11.1, 11.5, 11.6, 11.8, 11.9, 11.10
Unit V	:	Chapter 12: 12.1, 12.4, 12.5, 12.6
Chapter 13	:	13.1, 13 2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8

Reference Books:

1. An introduction to Operating systems concepts and Practice,Pramod Chandra P. Bhatt, PHI, Second Edition, 2008.

2. Operating System Concepts, Abraham Silberschatz Peter Galvin Greg Gagne, 6th edition Windows XP Update, Wiley India edition,2007.

3. Operating Systems Principles and Design, Pal Choudhury, PHI Learning, 2011.

4. Operating Systems, A Concept Based Approach Dhananjay M.Dhamdhere Tata Mc Graw Hill.

CS13: Lab 10: 3D Modelling and Texturing
(6 Hours- 4 Credits)

Objectives:

- To give exposure of creating object, texturing and shading environment.
- To give real time exposure in creating characters for animation.
- To give exposure of handling 3d studio max software.

Exercises:

1) Learning Interface of 3D Studio Max.
2) Learning Tools.
3) Designing Spline modeling.
4) Creating & editing 2D Splines.
5) Learning Spline Modifier.
6) Polygon modeling.
7) Editing poly objects.
8) Graphite modeling tools.

9) Learning surface batches.
10) Object Union, Separation, intersection, cut and refine.
11) Learning shape merge, terrain, connect & loft object.
12) Learning Meshes and Morphed object.
13) Learning architecture modeling.
14) Modeling Interior room setup.
15) Exterior Modeling.
16) Matching Lighting with nature.
17) Modeling for game environmental.
18) Understanding map types.
19) Wrapping technique.
20) Texture painting in Adobe Photoshop.

Reference Books:

1. Kelly L. Murdock's Autodesk 3ds Max 2021 Complete Reference Guide, Published August 21, 2020.

2. Autodesk 3ds Max 2021 Fundamentals Published August 18, 2020 by ASCENT

CS14: Lab 11: Open Source Technology: (Php | Mysql)
(5 Hours- 3 Credits)

Exercises:

Write PHP programs for the following

1. To demonstrate all array operations (array _ search(), array_diff(), array_combine(), array_match(),sort().

2. To demonstrate all control statements (find factorial of the given number using IF, While, Do-while.).

3. To display inventory table using Key & value pairs.

4. To print student table using key & value pairs and search particular student number(whether it is present or not).

5. To illustrate user defined function (define all function type).

6. Function without input argument and no return value.

7. Function without input argument and return value.

8. Function with input argument and no return value.

9. Function with input argument and return value.

10. Function with default argument.

11. To find factorial of the given number using recursion.

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12. To calculate nCr using include command to include the factorial function.

13. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. To perform string manipulation.

14. To process personal details using File.

15. To design an student mark database using HTML Form and process using PHP.

Write My SQL programs for the following

DDL Commands

Createtable, altertable, droptable

DMLCommands

- Select, update, delete and insert statements.
- Condition specification using Boolean and comparison operators
- (and,or,not,=,<>,>,<,>=,<=).
- Arithmetic operators and aggregate functions (Count, Sum, Avg, Min, Max)
- Multiple table queries (join on different and same tables).
- Nested select statements.
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by having.
- Arranging using order by.

1. 1Create a table Student-master with the following fields client_no,name,address,city,state, pincode, remarks, bal_due with suitable data types.

   a. Createanothertablesupplier_tablefromclient_master.Selectallthe fields and rename client_no with supplier_no and name withsupplier_name.

   b. Insertdataintoclient_master

   c. Insertdataintosupplier_masterfrom client_master.

   d. Deletetheselectedrowintheclient_master.

2. Create a table sales_ order withs_order_no and product_no asprimary key. Set other fields to store client number, delivery address, delivery date, order status.

   a. Add a new column for storing salesman number using ALTER Command.

   b. Set the s_order_no as for egin key as column constraints.

   c. Set the s_order_no as for eign key as table constraints.

   d. Enforce the integrity rules using CHECK.

3. Create a table student _master with the following fields name, reg no, dept. and year with suitable data types. Use Select command to do the following.

    a. Select the student's name column.

    b. Eliminate the duplicate entry in table.

    c. Sort the table in alphabetical order.

    d. Select all the Students of a particular department.

4. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.

    a. Select each row and compute sell_price*.50 and sell_price*1.50 foreach row selected.

    b. Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.

    c. Select product_no, description, profit_percent, sell_price where profit_percentis not between 20 and30.

    d. Select the supplier name and product_no where supplier name has 'r' or 'h'as second character.

ES1.1: Client Server Computing
(5 Hours – 5 Credits)

Unit I:

Basic concepts of Client/Server – Characteristics – File Servers – Database servers – Transaction servers- Groupware servers – Objective servers – Web servers – Fat servers or fat clients – 2 tier versus 3 tier – Client/Server building blocks – Operating system services. Base services – Extended services – Server scalability – Client Anatomy.

Unit II:

NOS Middleware – Peer-to-peer communications – RPC – MOM Middleware – MOM versus RPC - The fundamentals of SQL and relational databases – Server architecture – Stored procedures, triggers and rules.

Unit III:

Online transaction processing – Decision support systems – OLTP versus DSS: programming effort, database needs – Data warehouses – Elements - Hierarchies

Replication versus Direct access – Replication mechanism – EIS/DSS Tools – Client/server transaction processing – transaction models – TP Monitors – Transaction management standards.

Unit IV:

Groupware – Components – Distributed objects and components – CORBA: components – Object Management Architecture – Services – Business objects.

Unit V:

Client/server Distributed system management – components – Management application – The Internet Management Protocols – OSI Management Framework

The Desktop Management Interface – X/Open Management Standards – Client/server application development tools – Client/Server Application Design.

Text Book:
1. Dan Harkey, Jeri Edwards and Robert Orfali, The Essential Client Server Survival Guide, 2nd Edition, Galgotia Publications Pvt. Ltd., 2000.

Reference Books:
1. Dawna Travis Dewire, Client/Server computing, Tata Mc Graw Hill.
2. Jafferey D. Schank, Novell's guide to Client/Server Application and Architecture, BPB Publications.
3. Robert Orfali, Dan Harkey and Jeri Edwards, The Essential Client/Server Survival Guide, Galgotia Publications Pvt. Ltd., 2002.

ES1.2: Android Programming
(5 Hours – 5 Credits)

Unit I :

Introduction to Android – Creating the First Android Project - Using the Text View Control Using the Android Emulator - Limitations of the Android Emulator Basic Widgets - Understanding the Role of Android Application Components - Understanding Activities - Role of the Android Manifest File - Creating the User Interface - Commonly Used Layouts and Controls- Displaying Messages Through Toast -Creating and Starting an Activity - Using the Edit Text Control .- Choosing Options with Check Box Choosing Mutually Exclusive Items Using Radio Buttons.

Unit II :

Building Blocks for Android Application Design -Laying Out Controls in Containers - Introduction to Layouts - Linear Layout - Relative Layout - Absolute Layout - Frame Layout - Table Layout - Operations Applicable to Table Layout Grid Layout - Specifying Row and Column Position - Adapting to Screen Orientation - Anchoring

Controls Defining Layout Utilizing Resources and Media- Resources - Creating Values Resources- Using Drawable Resources – Switching States with Toggle Buttons.

Unit III :

Creating an Image Switcher Application - Scrolling Through Scroll View - playing audio – playing video - Using Selection Widgets - Using List View - Using the Spinner Control - Using the Grid View Control - Creating an Image Gallery Using the View Pager Control

Unit IV :

Displaying and Fetching Information Using Dialogs and Fragments – What are dialogs - Selecting the Date and Time in One Application – Fragments - Creating Fragments with Java Code -Creating Special Fragments

Unit V :

Creating Interactive Menus and Action Bars- Menus and Their Types - Creating Menus Through XML - Creating Menus Through Coding - Applying a Context Menu to a List View Using the Action Bar - Replacing a Menu with the Action Bar - Creating a Tabbed Action Bar - Creating a Drop-Down List Action Bar - Using Databases - Using the SQ Lite Open Helper Class - Accessing Databases with the ADB - Creating a Data Entry Form.

Text Book :

Android Programming Unleashed, B.M. Harwani, Pearson Education, Inc., I edition 2013.

Unit I	:	Chapters 1 and2
Unit II	:	Chapters 3 and4
UnitIII	:	Chapters 4 and5
UnitIV	:	Chapter 6
UnitV	:	Chapter 7 and8

Reference Books :

1. Android Apps for Absolute Beginners – II Edition –Wallace Jackson – Apress-2013.

2. Android Application Development All-in-One For Dummies - Barry A. Burd – 2011–Wiley.

3. The Android book – Imagine Publishing Ltd -2011.

ES1.3: Mobile Computing

(5Hours –5 Credits)

Unit I :

Introduction: Mobility Of Bits And Bytes – Wireless: The Beginning - Mobile Computing- Networks-Middle ware And Gateways- ApplicationsAndServices

Standard Bodies. Mobile computing Architecture: Architecture For Mobile Computing-Three Tier Architecture. Emerging Technologies: Bluetooth-Radio Frequency Identification (RFID) – Wireless Broadband (Wimax) - Mobile IP-Internet Protocol Version 6 (IPv6).

Unit II :

Global System For Mobile Communications (GSM): Global System For Mobile Communications. GSM Architecture - GSM Entities - Call Routing In GSM. Short message Service (SMS): Mobile computing over SMS – Short Message service – Value added service through SMS. General Packet Radio Service: Introduction – GPRS and Packet Data Network – GPRS network architecture - GPRS network operations - Data services in GPRS - Applications for GPRS – Limitations for GPRS– Billing and Charging in GPRS–Enhanced Data Rates for GSM Evolution (EDGE).

Unit III :

Wireless Application Protocol (WAP): Introduction – WAP – MMS – GPRS Application. - **CDMA AND 3G:** Third generation networks – Applications on3G. **WirelessLAN:** Wireless LAN advantages - IEEE802.11 standards-wireless LAN architecture.

Unit IV:

Client Programming: Introduction - Moving Beyond The Desktop - A Peek Under The Hood: Hardware Overview - Mobile Phones – Features of Mobile Phones – PDA – Design Constraints In Applications For Handle Held Devices. **Programming for the palm OS:** Palm OS Architecture. **Wireless devices with Symbian OS:** Symbian Os Architecture. **Wireless devices with windows CE:** Windows CE Architecture.

Unit V:

Multimedia: Networked Multimedia Application–Issues in Multimedia delivery over the Internet – Multimedia Delivery over the Internet – Multimedia Networking Protocols. **IP Multimedia Subsystem:** Introduction – IMS and its Evolution – Benefits from IMS – Architecture of IMS Networks – Protocols used in IMS–Building Blocks in IMS Networks. **Security issues in mobile computing:** Introduction - Information Security-Security Techniques and Algorithms-Security Protocols-Public Key Infrastructure.

Text Book:

Mobile Computing Technology, Applications and Service Creation -Asoke.K. Talukder, Roopa. R. Yavagal, Hasan Ahmed -McGraw Hill Publishing Company., 2nd Edition, 2011.

Unit I	:	Chapter1.1, 1.2, 1.3, 1.5,1.6, 1.7, 1.11, 2.4,2.5, 4.2, 4.3, 4.4, 4.5,4.6
Unit II	:	Chapters 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3,7.1 to7.9
Unit III	:	Chapters 8.1 to8.4, 9.6, 9.7,10.2, 10.3, 10.4
Unit IV	:	Chapters 12.1to 12.7, 13.3,14.2, 16.3
Unit V	:	Chapters 18.6 to 18.9,19.1 to 19.6,20.1 to 20.5

Reference Books:

1. Mobile Computing Theory and Practice – KumkumGarg – Pearson Education, 2010.

2. Mobile Computing – Sipra Dasbit, Biplab K. Sikdar – PHI Learning, Eastern Economy Edition, 2009.

3. Principles Of Mobile Computing, Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober – Second Edition – Springer (India) Private Limited– Seventh Indian Reprint, 2008.

NME1: Drawing and Visual Art
(2 Hours – 2 Credits)

Objectives:

- To visually perceive, analyze, and interpret visual information through the act of drawing.
- To recognize and synthesize the representational and abstract considerations of drawing.
- To gain an understanding of how to incorporate narrative, psychological, emotional, and conceptual aspects of drawing.
- To develop an individual drawing language that allows you to express your own vision and ideas.

Unit I: Introduction to Drawing

Definitions of drawing, Starting a drawing & composition- Shading, blending, contrast- Lines & cross hatch basics- One/two-point basic linear perspective

Unit II: Introduction to Visual Literacy

Basic principles of Visual Literacy. Application of Visual Elements – Basic Sketching and Drawing Skills – About Colour – Types of medium- Mixing media, found materials & collage.

Unit III: Study of Human Anatomy

Psychology Of Human Perception- Proportion and Perspective drawing – Composition, Light and Shade, Surface textures- Forms and postures, portraiture stick figures, cartoon characters and story board.

Unit IV: Principles of Design

Principles of Design – Symmetry, Rhythm, contrast, balance, focal point. Application – Transforming the visuals into layout – Finished layouts – Qualities of effective layouts – Thumb Nail, Rough Layouts – Designing Industrial Products.

Unit V: Media Mix

Pencil, charcoal, pen and ink, crayons, pastels, water and oil. Colour paints. Study of still life- Inanimate objects, Vegetables, fruits, birds, animals, etc. Study of trees, buildings, landscape, cityscape, seascape

Text Book:

1. Loomis, A. Figure Drawing, for All It's Worth, by Andrew Loomis. Chapman and hall.

Reference Books:

1. Goldfinger, E. (1991). Human anatomy for artists: The elements of form. New York: Oxford University Press.

2. Thomson, A. (1896). A handbook of anatomy for art students. Clarendon Press.

3. Dow, A. W. (1997). Composition: A series of exercises in art structure for the use of students and teachers. Univ of California Press.

Websites:

https://www.finearttips.com
https://www.thoughtco.com

SBS5: Lab12: 3D Lighting and Rendering

(2 Hours – 2 Credits)

Objectives:

- To provide students to establish a methodology for lighting a design in 3DS max
- To develop an understanding of rendering techniques and its applications
- To develop an understanding of composition through lighting, camera, and colors

Exercises:

1) Understanding the Basic workflow for lights.

2) Digital lighting techniques(3 point light).

3) Learning Properties for light.

4) Learning Positioning of light.

5) Learning Animating light.

6) Learning common lighting parameters.

7) Learning Intensity/color/attenuation.

8) Learning Shadows parameters.

9) Learning Mental ray indirect illumination(caustics and GI).

10) Learning photometric lights.

11) Learning Mental ray sun & sky, Atmospheres & effects for light.

12) Understanding the camera position techniques.

13) Understanding the camera rendering effects.

14) Understanding the DOF concept.

15) Learning Motion Blur and Contour shading.

Reference Books:

1. Mastering autodesk 3ds max design 2011 by mark gerhard, jeffrey harper, publisher-sybex; 1 edition (august 16, 2010).

2. Kelly L. Murdock's Autodesk 3ds Max 2021 Complete Reference Guide, Published August 21, 2020.

3. Autodesk 3ds Max 2021 Fundamentals Published August 18, 2020 by ASCENT

CS15: Data Communication and Computer Networks

(5 Hours – 5 Credits)

Unit I:

Introduction: A Brief History – Applications – Computer Networks – Categories of Networks – Standards and Standards Organizations – Network Architecture – Open Systems and OSI Model – TCP/IP Architecture. Communication Media and Data **Transmission:** Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing

Multiplexing. Error Detection and Correction: Types of Errors – Error Detection – Error Correction.

Data Link Control and Protocol Concepts: Flow Control – Error Control – Asynchronous Protocols – Synchronous Protocols – High-Level Data Link Control (HDLC).

Unit II:

Local Area Networks: Types of Networks and Topology –LAN Transmission Equipment – LAN Installation and Performance.

Ethernet: IEEE Standard 802.3 Token Bus: IEEE Standard 802.4 Token Ring: IEEE Standard 802.5 – Fiber Distributed Data Interface (FDDI) – Distributed Queue Dual Bus (DQDB): IEEE Standard 802.6 – LAN Operating Systems and Protocols – Ethernet Technologies.

Wide Area Networks: WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipments – WAN Design and Multicast Considerations – WAN Protocols.

Unit III:

Integrated Services and Routing Protocols: Integrating Services – ISDN Services – ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay – Comparison of ISDN, ATM and Frame Relay.

Wireless LANS: WLAN Applications – Wireless LAN Requirements – Planning for Wireless LANs – Wireless LAN Architecture – IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Services.

Unit IV:

Internet Working: Principles of Internet Working – Routing Principles – Internetwork Protocols (IP) – Shortcomings of IPv4 – IP Next Generation.

TCP Reliable Transport Service: Transport Protocols – The Service TCP Provides to Applications – End –to-End Service and Datagrams – Transmission Control Protocol – User Datagram Protocol.

Unit V:

Network Applications: Client-Server Model – Domain Name System (DNS) – Telnet – File Transfer and Remote File access – Electronic Mail – World Wide Web (WWW) Network Management: Goal of Network Management

– Network Management Standards – Network Management Model – Infrastructure for Network Management – Simple Network Management Protocol (SNMP).

Text Book:

1. **Data Communications and Computer Networks,** Brijendra Singh, Second Edition, PHI, 2006.

   Unit I   : Chapters 1,2,3,5
   Unit II   : Chapters 6,7
   Unit III   : Chapters 8, 9
   Unit IV   : Chapters 10,11
   Unit V   : Chapter12

Reference Books:

1. Computer Networks, Andrew S Tanenbaum, 4th Ed, Prentice Hall of India,2006.
2. Data Communications and Computer Networks, Prakash C. Gupta, Prentice Hall of India, 2005.
3. Data and Computer Communications, William Stallings, PHI, 2007.
4. Data Communication and Networking, Behrouz A. Forouzan, TMH,2005.
5. Data Communications and Networks, Achyut S Godbole, TMH, 2005.

S16- Lab13: Game Designing and Development
(6 Hours 4 credits)

Objectives:

- To understand the game designing process.
- To understand the Unity interface.
- To understand the techniques of game publishing.

Exercises:

1) Learning interface of Unity software.
2) Understanding tools.
3) Understanding navigations.
4) Learning importing and organizing files.

5) Creating foliage and environment.
6) Production basics: Lighting, materials, effects, etc.
7) Working with 3D games.
8) Learning rigid body physic.
9) User input and UI, UI designing.
10) Unity Editor.
11) Balancing and analyzing games.
12) Placing and organizing game assets.
13) Working with animations.
14) Creating enemies.
15) 3D Characters: Animation & control.
16) Creating playback controls.
17) working on creation of Interactive environment,
18) Level creation and finalizing.
19) Publishing game for different platforms.
20) Understanding game formats.

Reference Books:

1) Introduction to Game Design, Proto typing, and Development– Jeremy Gibson

2) The Ultimate Guide to Video Game Writing and Design, Flint Dille & John Zuur Platten.

CS17: Lab 14: Visual Effects
(5 Hours – 3 Credits)

Objectives:
- To understand the techniques of visual effects.
- To understand the compositing tools of Adobe After effects software.

Exercises:
1) Understanding the interface of Adobe After Effects software.
2) Creating Transparency.
3) Key framing and Masking.
4) Creating Track masks in Motion - Mocha.
5) Utilizing the Roto Brush tool.
6) Practicing Chroma Keying technique.
7) Practicing Isolate key elements with garbage.
8) Key cleanup exercise- Create light wrap- Extract effect.
9) Tracking exercise- Point tracking- Mocha AE planar tracking -Warp Stabilizer.
10) Camera tracking exercise- A Work with 3D layers.
11) Using effects in After Effects.
12) Creating destruction with Shatter.
13) Creating fire with particles .
14) Practice in Versatile uses of Turbulent Noise .
15) Practicing in Distort layers with the Puppet tool.

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16) Practicing in Composite 3D Renders- Organize the passes - Composite the passes.
17) Practicing in Depth passes for 3D comps.
18) Working with Rendering- Using Media Encoder.
19) Practicing Rig removal.
20) Practicing VR motion tracking work flow.

Reference Books:

1. Digital compositing for film & video by Steve Wright Publisher: Focal Press Professional .

2. Digital compositing by Lee Lanier. Publisher: Sybex; Pap/Dvdr O edition.

3. After Effects CC 2021 Essential Training: VFX https:// www. linked in.com / learning / after - effects - cc - 2021 - essential - training-vfx/welcome? auto play= true & trk = learning - course_tocItem & up sell Order Origin = lynda_redirect_learning.

ES2:1 Software Engineering
(Hours 5- Credits 5)

OBJECTIVES:

- To acquaint students with the basic concepts and major issues of software engineering
- To impart knowledge on the basic principles of software development life cycle.
- To know the benefits of software analysis, design, testing and documentation efforts

Unit I:

Introduction to Software Engineering: Some Definitions – Some Size factors –Quality and Productivity Factors–Managerial Issues. Planning a Software Project: Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

Unit II:

Software Cost Estimation: Software Cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs.

Unit III:

Software Requirements Definitions: The Software Requirements Specification – Formal Specification Techniques–Languages and Processors for Requirements Specification.

Unit IV:

Software Design: Fundamental Design Concepts – Modules and Modularization Criteria–Design Notations–Design Techniques–Detailed Design Considerations–Real-

Time and Distributed System Design – Test Plans – Milestones, Walkthroughs, and Inspections - Design Guidelines.

Unit V:

Verification and Validation Techniques: Quality Assurance – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.

Software Maintenance: Enhancing Maintain ability During Development–Managerial Aspects of Software Maintenance – Configuration Management –Source-Code Metrics–Other Maintenance Tools and Techniques.

Text Book:

1. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill Publishing Company Limited, New Delhi, 1997.

   Unit I   :   Chapters: 1.1 – 1.4, 2.1-2.5
   Unit II   :   Chapters:3.1 -3.4
   Unit III   :   Chapters: 4.1 – 4.3
   Unit IV   :   Chapters:5.1–5.9
   Unit V   :   Chapters:8.1, 8.3– 8.7, 9.1– 9.5

Reference Books:

1. Software Engineering – K.L.James, Prentice Hall of India Pvt. Ltd., New Delhi, 2009.

2. Fundamentals of Software Engineering – Rajib Mall, Prentice Hall of India Pvt. Ltd., New Delhi, 2003.

3. Software Engineering (A Practitioner's Approach) - Roger. S.Pressman. McGraw Hill Publication, International Edition, 5th Edition. 2001.

ES2. 2: Rendering Techniques
(5 Hours – 5 Credits)

Objective:

- The objective of the course is to learn Rendering is the process of creating the effects of light, shade and light source to achieve contrast in drawings. rendering improves the quality of line drawings. while line drawing indicate more of the shape than the form of an object drawn, rendering improves the quality of the drawing so as to give it a photo- realistic quality.

Unit I:

Pre-production, Production and Postproduction

Pre-production Overview - Production Overview - Post-production - Overview

Creating Materials and Shaders

Introduction to Materials - Diffuse Group - Reflection Group - Refraction Group - Self-Illumination Group - Bidirectional Reflectance Distribution Function rollout - Options Roll-Out - Maps Roll-Out.

Unit II:

Cameras and Lighting in V-Ray

Cameras: V Ray Physical Camera - Depth of Field, Bokeh Effects, - Sampling and Distortion - Lighting in V-Ray.

Unit III:

Rendering in V-Ray

Render Set-Up: V-Ray - V-Ray Frame Buffer - Parameters - Global Switches -

Image Sampler (Antialiasing) - Adaptive Image Sampler - Environment - Color Mapping - Global Illumination.

Unit IV:

Interior Daylight: Pre-production .
Client Brief - Photo References and - Mood Board.

Interior Daylight: Creating Materials .
Creating Materials - Glass Material - Metal Material - Hand Rails - Floor - Ceiling Panels - Ceiling Lights - Walls - Conclusion.

Interior Night Time: Pre-production.
Client Brief - Photo References and - Mood Board.

Unit V:

Exterior Daylight: Pre-production
Client Brief - Photo References and - Mood Board

Exterior Daylight : Creating Materials
Pavement - Texturing: Metal - Window Glass - Brick - Polished Wood

Reference Book :

3D Photorealistic Rendering. Interiors & Exteriors with V-Ray and 3ds Max – Jamie Cardoso – CRC Press.

ES2.3 Web Graphics and Games
(5 Hours –5 Credits)

Objective:
The objective of the course is to learn the graphic technology involved in making of web games.

Unit I:
Introduction to game development for the web : Introduction – anatomy – examples – The HTML5 game platform – Web technologies for game developers.

Unit II:
APIs for game development : Canvas – CSS – Full Screen – Gamepad – Indexed DB – Java script – Pointer Lock – SVG – Typed Arrays – Web Audio – WebGL – WebRTC – Web Sockets – WebVR – Web Workers – XMLHttp Request.

Unit III:
Techniques : Using async scripts for asm.js – Optimum startup performance – Using Web RTC peer to peer data channels – Efficient animation for web games – Audio for Web Games – 2D collision detection – Tiles and tile maps overview.

Unit IV:
3D games on the Web : 3D games on the web overview – Explaining basic 3D theory – Building up a basic demo with A – Frame – basic demo with Babylon.js – basic demo with play canvas – basic demo with three.js – WebVR – 3D Collision detection – Bounding volume collision detection with three.js

Unit V:
Implementing game control mechanisms : Control Mechanisms – Mobile touch – Desktop with mouse and keyboard – Desktop with game pad
Publishing games. Publishing games overview – Game distribution – Game promotion – Game monetization

Reference Books:
1) How to Design 3d Games With Web Technology - Book 01,JordiJosa
2) Learning Web Design Fourth Edition, Jennifer Niederst Robbins

3) ES3- Project Work / Viva-Voce
(5Hours 5 Credits)

Objectives:

To introduce the students to a working environment for making project in either computer science based or in animation content

To provide them experience of a real time production process, and to make student experience the project pipeline.

Project:

Students may form a team / individual to execute mini project in CS based / Graphics /Animation / Games based to carry as show reel for their career.

Students must submit their project in the form written script and digital form

Viva voice will be conducted

NME 2- Film Analysis
(2Hours 2 credits)
Objectives:

- To learn about the methodology of formulating visual analytic tools by. combining interactive visualizations with analytical techniques.
- To study the fundamentals of interactive visualizations.

Unit I: Semiotics Visualization

Vision and visualisation - The social conditions and effects of visual objects. Visual culture. Critical visual methodology- Metaphor and metonymy – codes – semiology of the television medium.

Unit II: Psychoanalytic Analysis

An introduction to compositional interpretation - Colour - Spatial organization – Light - Expressive content- the Oedipus complex – id, ego, super ego – symbols – defence mechanisms – Dreams – Aggression and guilt – psychoanalytic analysis of the media.

Unit III: Cultural Analysis

Cultural analysis of visual – semiotics, denotation, connotation and iconography.

Unit IV: Analysis Of Visual Images

Analysis of film and television – six levels of analysis - psychoanalytic understanding of visual images.

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Unit V: Interpretations Of Advertisement

Selling magic – Breaking the advertising code – commercials and anxiety – Laconian gaze: other ways of seeing -Laura Mulvey and visual pleasure.

Text Books:

1. Carey, Jewitt - The Handbook of Visual Analysis, Himalayapublishers.(1999)
2. Leewen, Thompson,- Introducing Social Semiotics, Routledge, London(2001)
3. Innovative Approaches of Data Visualization and Visual Analytics edited by Huang, Mao Lin.

Reference Books:

1. Berger, Arthur Asa - Media Analysis Techniques, Sage, (2002).
2. Bignell, Jonathan, Media Semiotics, Routledge, London, (2002).
3. Leewen and Jewitt Carey – Handbook of Visual Analysis, Sage Publication, New Delhi, (2001).

Web Resources:

1. https://www.youtube.com/watch?v=sM2MOyonDsY

2. https://www.youtube.com/watch?v=WEeugeUTINg

3. https://www.youtube.com/watch?v=oGNijt1gC1M

4. https://en.wikipedia.org/wiki/Visual_analytics

SBS 6: Quantitative Aptitude
(2 Hours - 2 Credits)

Unit I: Numbers - HCF & LCM of numbers – Decimal Fractions

Unit II: Square roots and Cube roots- Average – Problems on ages.

Unit III: Percentage – Profit and Loss – Ratio and Proportion.

Unit IV: Time and Work – Time and Distance.

Unit V: Simple Interest – Compound Interest.

Note: Example problems – Minimum 70% & Exercise Problems – Maximum 30% to be set in Question paper

Text Book:

Quantitative Aptitude, R.S. Aggarwal, S. Chand & Company Ltd, New Delhi, Reprint 2011.

Unit I	:	Page nos.	3-29, 30-45, 46-66
Unit II	:	Page nos.	117-138, 139-160, 182-194
Unit III	:	Page nos.	208-250, 251-293, 294-310
Unit IV	:	Page nos.	341-370, 384-404
Unit V	:	Page nos.	445-465, 466-486

Reference Books:

1. Quantitative Aptitude and reasoning, R.V. Praveen, PHI Learning, 2ndEdition 2013.

2. Magical book on Quicker Maths, M.Tyra, BSC Publishing Co. Pvt. Ltd, New Delhi. Reprint, 2011.

3. Quantitative Aptitude for Competitive Exams, Abhijit Guha, 4th Edition, Tata Mc Graw Hill Company, New Delhi.

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