Name of Program: M Sc. (CS)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCCS202	COMPULSORY	Basics of Computer Graphics	3	1	0	4	60	20	20	--	--

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical;   C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

*Teacher Assessment shall be based on following components: Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

- To provide knowledge about hardware and software used in computer Graphics.
- To understand the knowledge about drawing algorithms.
- To provide detailed knowledge about color and intensity levels.
- To acquaint students with windowing and clipping.
- To make the student understanding about Rendering

Course Outcomes (Cos):

- An ability to understand basic knowledge of Computer Graphics.
- An ability to apply knowledge of Computer Graphics.
- An ability to understand the color and intensity levels.
- An ability to identify visible area of any surface.
- An ability to understand rendering and reflection

UNIT 1:Introduction Computer Graphics: Introduction to Image and Objects, Image Representation, Types of Refresh Graphic Displays, Interactive Devices, Applications of Computer Graphics, Display Devices, Cathode Ray Tubes, Raster-Scan Display, Random-Scan Display, Plasma panel.

UNIT 2: Scan-Conversion of Graphics Primitives: Scan-Conversion of a Lines :Digital Differential Analyzer Algorithm, Bresenham's algorithm for line and circle, Attribute of output primitive, line style, color and intensity, Polygon filling , Edge filling Algorithm , Seed Fill Algorithm, Area Filling Algorithm, Scan Line Algorithm , Boundary Fill Flood Fill Algorithm , Antialiasing Techniques

UNIT 3: Two Dimensional Graphics Matrix Representations and Homogeneous Coordinates ,Composite Transformations; Two Dimensional Viewing – Viewing Pipeline, Window-to-Viewport Coordinate Transformation, **Clipping Operations** – Point Clipping ,Line Clipping and Polygon Clipping Algorithms.–Cohen –Sutherland, Line Subdivision Algorithm, Mid point Sub-Division Cyrus-Beck algorithm, 2 D Parametric Clipping

UNIT 4:Three Dimensional Graphics: 3 D Viewing :Three Dimensional Concepts, 3 D Representation Polygon and Curved Surface, Design of Curves & Surfaces- Bezier's Method, B-Spline Methods, 3 D Transformation Transition, Scaling, Composite Transformation Rotation About Arbitrary Axis, Projection: Parallel & Perspective

UNIT 5: Rendering Illumination Model: Surface normal, Reflection vector, Effect of Ambient Object, Specular Reflection , Halfway vector, Shading, Ray tracing, color

Suggested Readings:

1. D.Hearn and M.P. Baker "Computer Graphics" (2nd ed), PHI.
2. S. Harrington – "Computer Graphics - a Programming approach" (2nd ed) McGrawhill.
3. New Mann &Sprovl- "Principles of interactive computer graphics" (2nd ed) McGrawhill.
4. Roger S. David "Procedural Elements for Computer Graphics", McGraw Hill.
5. Roger S David "Mathematical Elements for Computer Graphics", McGraw Hill.
6. Foley &Vandan "Computer Graphics Principles & Practice in "C" "AddisionWesly.
7. TayVaugham "Multimedia Making it Work" 5th Ed. 2001, Tata McGraw Hill.
8. Prabhat K. Andleigh&Kiran Thakur "Multimedia System Design", PHI
9. Drew, "Fundamentals of Multimedia", Pearsons.

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Name of Program: M Sc. (CS)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCCS203	COMPULSORY	Principles of Operating System	4	0	0	4	60	20	20	--	--

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical;   C - Credit;
Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):-
1. To provide knowledge of the underlying principles, techniques and approaches of designing an operating systems.
2. To provide the knowledge of inherent functionality and processing of program execution.
3. To emphasize on how the various elements that underlie operating system interact and provides services for execution of application software
4. To make the students aware with the different Operating Systems.

Course Outcomes (COs): After the completion of the course student will be able to
1. Understand the functions, structures and history of operating systems.
2. Understand the design issues associated with operating systems.
3. Understand and apply various process management concepts including scheduling, synchronization, deadlocks and multithreading.
4. Demonstrate the concepts of memory management including virtual memory.
5. Master system resources sharing among the users.
6. Apply the knowledge related to file system interface and implementation, disk management.
7. Be familiar with protection and security mechanisms.
8. Be familiar with various types of operating systems including Unix.
9. Students will demonstrate knowledge of process control, threads, concurrency, memory management scheduling, I/O and files, distributed systems, security, networking.

10. Enumerate and explain the function of the common operating system kernel routines that are provided by an operating system.

UNIT - I
Introduction: Evolution of OS with the generations of computers. Goals, Objectives, Functions of Operating System, Types of operating systems: Batch Processing, Multitasking, Multithreading, Multiprogramming and Real time operating systems etc. Different views of the operating system, System Programmer's view, User's view, Operating System structure: Layered Operating Systems, Monolithic Systems.

UNIT – II
CPU Scheduling: Processes: The Process concept, the process control block, Operating system services for process management. Types of Schedulers, Scheduling Criteria. Scheduling Algorithms.
Deadlocks: Deadlock, Condition for deadlock, Deadlock Prevention, Deadlock detection, Deadlock avoidance, Deadlock Avoidance algorithms, Starvation, Banker's algorithm

UNIT – III
Memory Management : Memory management without swapping or paging, Concept benefits of Virtual memory, Concepts of swapping and paging, Fragmentation, Page replacement algorithms, Belady's anomaly and the category of Stack algorithms, Modeling paging algorithms, Design issues for paging system, Segmentation.
Disks: Disk hardware, Disk I/O & Disk performance parameters and Disk scheduling policies(First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms

UNIT - IV
Concurrency and Synchronization: The need for inter-process synchronization, Principles of concurrency, Process interaction, Requirement for Mutual Exclusion, Mutual Exclusion Software Applications, Decker's algorithms, Mutual Exclusion Hardware support, Semaphore, Classical problems in concurrent programming, Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem, Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages.

UNIT-V
LINUX: History & Features of Linux, Linux Architecture, File System of Linux, Hardware Requirements of Linux, Various flavors of Linux, Linux Standard Directories, Functions of Profile and Login Files in Linux, Linux Kernel.

Suggested Readings:
1. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing, 1984.
2. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition- 1992.

3. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts".John Wiley & Sons, 1989.
4. Tanenbaum, A.S. "Modern Operating System", Prentice Hall of India Pvt. Ltd.1995.
5. William Stallings "Operating Systems" , Prentice Hall of India Pvt. Ltd.

Name of Program: M Sc. (CS)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCCS204	Compulsory	Data Structures and Algorithms	3	1	4	6	60	20	20	30	20

[A] Course educational Objectives (CEOs):

a) To develop the understanding among the students with the applications of Standard data structure in real world problems.
b) To get a good understanding of applications of Data Structures.
c) The analysis and evaluation of the data structure needs of particular problems;
d) To provide knowledge of the fundamental design, analysis and implementation of data structures and algorithms;
e) creation of new data structures.
f) To familiarize the students with the analysis and design a particular problem.

[B] Course Outcomes(COs):Students should be able to

a) Demonstrate familiarity with major algorithms and use of appropriate data structures.
b) Analyze performance of algorithms.
c) Determine which algorithm or data structure to use in different scenarios
d) Be familiar with writing recursive methods.
e) Apply programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems
f) Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs
g) Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.
h) Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.
i) Demonstrate understanding of various searching algorithms.

j) Program multiple file programs in a manner that allows for reusability of code.
k) Compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.
l) Design and implement C programs that apply abstract data types.

Unit –I:Data Structure: Introduction, Linear and Non Linear data Structure, Abstract Data Type, Concept of List and Array, Stack, Stack as an ADT, Stack operations and applications. Queues, Queue as an ADT, operations of Queues, Types of queues- Circular Queue, Dequeue, Priority Queue, Applications of Queue.

Unit- II: Linked List - Introduction, Memory Representations of Linked List, comparison; Primitive operations on Linked List, Linked Representation of Stack and Queue, Header Nodes. Types of Linked List: Doubly Linked List, Circular Linked List, Application of Linked List, Self Referential Structures.

Unit –III: Trees: Definition, Basic Terminology of Trees, Array and Linked Representations. Binary Trees, Binary Tree Operations. Binary Trees Traversals - Inorder, Preorder & Postorder, complete binary tree, almost complete binary tree; Application of Binary Tree, Threaded Binary tree, Height Balanced tree, B-tree. Forests, conversion of forest into tree. Heap: definition and applications.

Unit–IV: Complexity: concept and notations. Significance of different asymptotic notations. Searching Techniques and their comparison. Sorting - External and Internal Sorting, Insertion Sort, Selection Sort, Quick Sort, Bubble Sort, Heap Sort, Merge sort, Comparison of Sorting Methods. Hashing;

UNIT-V Graphs - Introduction, Basic Terminology, Directed, Undirected and Weighted graphs, Representation of Graphs, Graph Traversals - Depth First and Breadth First Search. Applications of Graphs: Spanning Trees, Minimum Cost Spanning Tree, Shortest Path Problem: Kruskal's and Dijkstra algorithms.

Note: Labs shall be conducted as per the prescribed syllabus.

 Suggested Readings:

1. Kruse R.L. "Data Structures and Program Design in C", PHI
2. Aho "Data Structure & Algorithms".
3. Trembly&Sorrenson,"Introduction to Data Structure with Applications".
4. TennenBaum A.M. & others, "Data Structures using C & C++"; PHI
5. Horowitz &Sawhaney:,"Fundamentals of Data Structures", Galgotia Publishers.
6. YashwantKanetkar, "Understanding Pointers in C", BPB.

7. Data structure: by Lipschuists (schaum 's outline series McGraw hill publication)
8. Ellis Horowitz and SartajSawhney," Fundamentals of Computer Algorithm:"

Name of Program: M.Sc.(Computer Science)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCCS205	Compulsory	Object Oriented Programming with Core JAVA	3	1	4	6	60	20	20	30	20

Course Education Objectives (CEOs):

*   Students must be able to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
*   Students must be able to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
*   Students must have the ability to write a computer program to solve specified problems.
*   Students must be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes (COs):

After the successful completion of the course students will be able to perform the following tasks:

*   Write, compile, and execute Java programs that may include basic data types and control flow constructs using Integrated Development Environments (IDEs) such as Eclipse, NetBeans, and JDeveloper.
*   Write, compile and execute Java programs using object oriented class structures with parameters, constructors, and utility and calculations methods, including inheritance, test classes and exception handling.
*   Write, compile, and execute Java programs using arrays and recursion, manipulating Strings and text documents.
*   Write, compile, and execute Java programs that include GUIs and event driven programming.
*   Write a final project that may be selected from among the following: applets for inclusion

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in web pages; applets to access enterprise data bases in robust, enterprise three level applications; secure communications over the internet; or an approved project chosen by the student.

UNIT – I

Importance and features of Java, *Language Construct of java including* Keywords, constants, variables and looping and decision making construct, Classes and their implementation, Introduction to JVM and its architecture including set of instructions. Overview of JVM Programming. Internal and detailed explanation of a valid .class file format. Instrumentation of a .class file.

UNIT - II

Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors.

class inheritance: super class, sub class, this and super operator, method overriding, use of final, packages, abstract class, interface.

Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes.

Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

Polymorphism: Method overloading, constructor overloading.

UNIT – III

Exception Handling: Exception Class, built in checked and unchecked exceptions, user defined exceptions, use of try, catch, throw, throws, finally.

Multi threaded programming: Overview, comparison with multiprocessing, Thread class and

runnable interface, life cycle, creation of single and multiple threads, thread priorities, overview

of Synchronization.

Java Library: String handling (only main functions). Elementary concepts of Input/Output: byte and character streams, System.in and Sysem.out, print and println, reading from a file and writing in a file.

UNIT – IV

Software Development using Java:

Applets: Introduction, Life cycle, creation and implementation.

AWT controls: Button, Label, Text Field, Text Area, Choice lists, list, scrollbars, check boxes, Layout managers.

Elementary concepts of Event Handling: Delegation Event Model, Event classes and listeners, Adapter classes, Inner classes.

UNIT – V

JDBC: JDBC Architecture, JDBC Drivers, Connecting to the Database

Introduction to Java Servlets: Life cycle, Interfaces and classes in javax.servletpackage(only

description) Creating a simple servlet.

Suggested Readings:
1. Patrick Naughton and HerbertzSchildt, "Java-2: The Complete Reference", TMH, 5theditio, 2002.
2. Bill Venners, "Inside Java Virtual Machine", TMH, 2nd edition.
3. Rick Darnell, "HTML 4 unleashed", Techmedia Publication, 2000
4. Shelley Powers, "Dynamic Web Publishing", 2nd edition, Techmedia, 1998.
5. Paul Dietel and Harvey Deitel, "Java How to Program", PHI, 8th edition, 2010.
6. E. Balagurusamy, "Programming with Java: A Primer", TMH, 1998.
7. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
8. Decker and Hirshfield, "Programming Java: A Introduction to Programming Using JAVA", Vikas Publication, 2000.
9. N.P. Gopalan and J. Akilandeswari, "Web Technology- A Developer's Perspective", PHI, 2nd edition
10. Eric Jendrock, Jennifer Ball,Debbei Carson, "The Java EE5 Tutorial", Pearson, 3rd edition, 2007.
11. Daniel Liang, "Introduction to Java Programming", Pearson, 7th edition, 2010.

List of Experiments:

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
2. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

3. Write a Java program for sorting a given list of names in ascending order.
4. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use StringTokenizer class).
5. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program for creating multiple threads
   a) Using Thread class.
   b) Using Runnable interface.
8. Write a Java program that illustrates how run time polymorphism is achieved.
9. Write a java program that illustrates the following
   a) Creation of simple package.
   b) Accessing a package.
   c) Implementing interfaces.
10. Write a java program that illustrates the following
    a) Handling predefined exceptions.
    b) Handling user defined exceptions.
11. APPLETS
    a) Working with Frames and various controls.
    b) Working with Dialogs and Menus.
    c) Working with Panel and Layout.
    d) Incorporating Graphics.
    e) Working with colours and fonts.
12. SWINGS
    Jpanel- Jframe – Jtoolbar—JwindowFramework

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