Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

Department of Computer Sciences

MASTER OF SCIENCE IN COMPUTER SCIENCE

Course Structure and Scheme of Examination w.e.f 2023-24

I Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS1.1.1	Advanced Data Structures	4	-	60	40	100	4
MSCS1.1.2	Discrete Mathematical Structures	4	-	60	40	100	4
MSCS1.1.3	Computer Organization	4	-	60	40	100	4
MSCS1.1.4	Object Oriented Programming Using JAVA	4	-	60	40	100	4
MSCS1.1.5	Operating Systems	4	-	60	40	100	4
MSCS1.1.6	Advanced Data Structures Using JAVA Lab	-	3	50	50	100	1.5
MSCS1.1.7	Computer Organization Lab	-	3	50	50	100	1.5
MSCS1.1.8	Operating Systems Lab	-	3	50	50	100	1.5
Total		**20**	**9**	**450**	**350**	**800**	**24.5**

II Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS1.2.1	Web Programming	4	-	60	40	100	4
MSCS1.2.2	Data Base Management Systems	4	-	60	40	100	4
MSCS1.2.3	Artificial Intelligence	4	-	60	40	100	4
MSCS1.2.4	Computer Networks	4	-	60	40	100	4
MSCS1.2.5	Formal Languages and Automata Theory	4	-	60	40	100	4
MSCS1.2.6	**Elective – I:** (i) Image Processing (ii)Information Retrieval System (iii) Design and Analysis of Algorithms	4	-	60	40	100	4
MSCS1.2.7	**Open Elective -I**	4		60	40	100	4
MSCS1.2.8	Web Programming Lab	-	3	50	50	100	1.5
MSCS1.2.9	Data Base Management Systems Lab	-	3	50	50	100	1.5
MSCS1.2.10	Computer Networks Lab	-	3	50	50	100	1.5
Total		**28**	**9**	**570**	**430**	**1000**	**32.5**

III Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS2.1.1	Object Oriented Analysis and Design with UML	4	-	60	40	100	4
MSCS2.1.2	Network security	4	-	60	40	100	4
MSCS2.1.3	Data Warehousing and Data Mining	4	-	60	40	100	4
MSCS2.1.4	Python Programming	4	-	60	40	100	4
MSCS2.1.5	**Elective – II:** (i)Data Science (ii) Cloud Computing (iii) Internet of Things(IoT)	4	-	60	40	100	4
MSCS2.1.6	**Open Elective – II**	4	-	60	40	100	4
MSCS2.1.7	Python Programming Lab	-	3	50	50	100	1.5
MSCS2.1.8	OOAD Lab	-	3	50	50	100	1.5
Total		**20**	**6**	**460**	**340**	**800**	**27**

IV Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS2.2.1	Seminar	-	-	-	50	50	2
MSCS2.2.2	Project	-	-	50	50	100	12
Total		-	-	**50**	**100**	**150**	**14**

Total (Complete Course)	Periods / Week		Max Marks		Total	Credits
	Theory	Lab	Ext.	Int.		
	64	**24**	**1570**	**980**	**2550**	**98**

MASTER OF SCIENCE IN COMPUTER SCIENCE

Syllabi

With effect from 2023-24 admitted batch

Chairman

Board of Studies

(2023-24)

Department of Computer Science

Gayatri Vidya Parishad College for Degree and PG Courses(A)

Affiliated to Andhra University

Visakhapatnam

MASTER OF SCIENCE IN COMPUTER SCIENCE

Syllabi

With effect from 2023-24 admitted batch

I YEAR I SEMESTER

I Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS1.1.1	Advanced Data Structures	4	-	60	40	100	4
MSCS1.1.2	Discrete Mathematical Structures	4	-	60	40	100	4
MSCS1.1.3	Computer Organization	4	-	60	40	100	4
MSCS1.1.4	Object Oriented Programming Using JAVA	4	-	60	40	100	4
MSCS1.1.5	Operating Systems	4	-	60	40	100	4
MSCS1.1.6	Advanced Data Structures Using JAVA Lab	-	3	50	50	100	1.5
MSCS1.1.7	Computer Organization Lab	-	3	50	50	100	1.5
MSCS1.1.8	Operating Systems Lab	-	3	50	50	100	1.5
Total		**20**	**9**	**450**	**350**	**800**	**24.5**

MSCS 1.1.1

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester I

ADVANCED DATA STRUCTURES

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To discuss about stacks and queues using arrays and linked lists.
2. To develop programs for searching and sorting algorithms.
3. To explain the concepts of various trees.
4. To implement programs using graphs.

SYLLABUS

UNIT I:

Introduction to Data Structures: Abstract Data Types, Arrays, List ADT, Stack ADT and operations, implementation of Stacks using Arrays. Applications of Stacks: Infix to Postfix conversion and postfix evaluation, Recursion.

UNIT II:

Queue ADT: Operation on queues, implementation of queues using arrays, circular queues and implementation. Single Linked Lists: single linked lists and operations, implementation of single linked lists, implementation of stacks and queues using single linked lists.

UNIT III:

Doubly linked lists: Operations, implementation of doubly linked lists, dequeues. Trees: Terminology, basic properties and representation, Binary trees, traversals of a binary tree - Binary Search Trees, AVL Trees, B-Trees, B+ Trees, B* Trees.

UNIT IV:

Graphs: Definition and representation of graphs, Graph traversal techniques, Minimal spanning trees-Prims and Kruskals algorithms, Dijkstraw's shortest path Algorithm. Hashing: Common Hash functions, Collision Resolution techniques, Dictionary ADT.

UNIT V:

Sorting: General Background, Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Merge Sort, Heapsort. **Searching:** Linear Search, Binary Search, Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

Outcomes:

1. Acquires knowledge on implementation of Stacks and their applications.
2. Develop knowledge on queues and linked lists.
3. Ability to implement various tree data structures and their properties.
4. Acquires knowledge on graphs and its applications.
5. Familiarizes with various sorting and searching techniques.

Text Book:

Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Edition.

Reference Books:

1.Data Structures and Algorithms in Java, Mitchell Waite, Signature Series.
2.Data Structures and Algorithms in C++, 2nd edition, A. Drozdek, Thomson.
3.The complete Reference Java2 5th Edition by Patrick Naughton and Herbert schildt. TMH

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc (CS)-Semester I

DISCRETE MATHEMATICAL STRUCTURES

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
2. Solve problems using Set Laws, Operations and properties of relations, Functions and Types of functions and Recursive Functions.
3. Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle, and binomial expansion.
4. Definition and identify different types of Graphs, Trees and Minimal spanning trees and Tree traversal Algorithms.

SYLLABUS

UNIT- I:

Mathematical Logic: Statements -connectives and Truth Tables-Tautology and contradiction -Logical Equivalence, Laws of Logic- Duality-Connectives NAND and NOR forms-Converse –Inverse and Contrapositive- Logical -Rules of Inference- Open Statements-Quantifiers.

UNIT- II:

Sets and Relations: Sets and Subsets-Operations on Sets and Laws of Set Theory- Cartesian Product of Sets-Relations-Operations on Relations-Properties of Relations-Equivalence Relations-Partial Orders-External elements in Posets.

UNIT- III:

Functions and Combinatory: Functions-Types of Functions-The Pigeonhole Principle-Recursive Functions-Definition-Fibonacci Series-Towers of Hanoi-The Rules of Sum and Product-Permutations-Combinations-Binomial and Multinomial Theorems-Combinations with Repetitions-The Principle of Inclusion-Exclusion.

UNIT- IV:

Graph Theory-I: Directed Graphs-Graphs-Isomorphism-Sub Graphs-Operations on Graphs-Walks and their classification-Connected and Disconnected Graphs-Euler circuits and Euler trials-Hamiltonian cycles and Hamiltonian paths.

UNIT- V:

Graph Theory-II: Planar and non-planar graphs-Graph Coloring-Map Coloring-Trees and their basic properties-Rooted Trees-Spanning Trees-Minimal Spanning Tree.

Outcomes:

1. Ability to apply the rules and laws of propositional logic on statements.
2. Understands the basic principles and operations on sets.
3. Attains capability to solve recursive functions and permutations and combinations.
4. Ability to understand graph theory and its applications.
5. Obtains knowledge in applications of trees.

Text Book:

Mathematical Foundations of Computer Science-3rd Edition-Dr. D.S.C.-Prism Books Pvt.Ltd.

Reference Book:

Discrete and Combinatorial Mathematics-An Applied Introduction-5th Edition –Ralph. P. Grimaldi. Pearson Education.

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc (CS)-Semester I

COMPUTER ORGANIZATION

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To study about structure and functional components of a computer.
2. Understanding the hierarchical organization of a computer system which consists of instruction set of commands.
3. Learn about the architecture of a computer from a programming view.
4. To design a balance system that minimizes performance and utilization of all elements.

SYLLABUS

UNIT-I:

Data Representation: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Error Detection Codes. (Chapter3, Text 1)
Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit- Operations. (Chapter 10, Text 1)

UNIT-II:

Digital Logic Fundamentals: Boolean Algebra, Basic Combinatorial Logic, More Complex Combinatorial Components, Combinatorial Circuit Designs, Basic Sequential Components, More Complex Sequential Components, Programmable Logic Devices. (Chapter 1, Text 2)
Instruction Set Architectures: Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A Relatively Simple Instruction Set Architecture, the 8085 Microprocessor Instruction Set Architecture. (Chapter 3, Text 2)

UNIT-III:

Introduction to Computer Organization: Basic Computer Organization, CPU organization, Memory Subsystem Organization and Interfacing, I/O Subsystem Organization and Interfacing, A Relatively Simple Computer, An 8085-based Computer. (Chapter 4, Text 2)
Register Transfer Languages: Micro-operations and Register Transfer Language, Using RTL to Specify Digital Systems, More Complex Digital Systems and RTL, VHDL-VHSIC Hardware Description Language. (Chapter 5, Text 2)

UNIT-IV:

CPU Design: Specifying a CPU, Design a Very Simple CPU, Implementation of a Very Simple CPU Internal Architecture of the 8085 Microprocessor. (Chapter 6, Text 2)
Micro-sequence Control Unit Design: Basic Micro sequencer Design, Design a Very Simple Micro sequencer, Implementation of a Very Simple Micro sequencer, Micro programmed Control vs. Hardwired Control. (Chapter 7, Text 2)

UNIT-V:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer,
Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA). (Chapter 11, Text 1)
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associate Memory, Cache Memory. (Chapter 12, Text 1)

Outcomes:

1. Understands about data representation and computer arithmetic.
2. Acquires knowledge on Boolean Algebra and 8085 instruction set architecture.
3. Understands the basics of computer organization.
4. Ability to understand and design CPU of a computer.
5. Ability to analyze the input and output organization of a computer.

Text Books:		

1.Computer System Architecture, M. Morris Mano, Third Edition, Pearson Education, 2007.
2.Computer Systems Organization & Architecture, John D. Carpinelli, Pearson Education, 2001.

Reference Books:

1.Digital Logic and Computer Organization, V.Rajaraman and T.Radhakrishnan, PHI Publication, 2006.
2.Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGrawHill.
3.Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int.Edition.

MSCS 1.1.4

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc (CS)-Semester I

OBJECT ORIENTED PROGRAMMING USING JAVA

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1.The main objective is to teach the basic concepts and techniques which form the object-oriented programming paradigm.

2.Students completing the course should know the model of object-oriented programming: abstract data types, encapsulation, inheritance and polymorphism.

3.Students completing the course should know fundamental features of an object-oriented language like Java: object classes and interfaces, exceptions and libraries of object collections.

4.Students completing the course should know how to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.

SYLLABUS

UNIT I:

Introduction: Object Oriented Paradigm - Basic Concepts of OOP - Benefits of OOP - Java history - Java Features - Java Environment - Simple Java Program - Java Program Structure - Java Tokens - Implementing a Java Program – JVM - Command Line Arguments – Variables – Constants - Data Types - Declaration of Variables - Scope of Variables - Type Casting – Operators - Control Statements.

UNIT II:

Arrays-Strings – Vectors- Classes-Objects-Methods: Defining a Class - Fields Declaration - Methods Declaration - Creating Objects - Accessing Class Members – Constructors - Methods Overloading - Static Members - Nesting of Methods.

Inheritance: Basics - Extending a Class - Extending a Class - Overriding Methods - Final Variables and Methods - Final Classes - Abstract Methods and Classes

UNIT III:

Interfaces and Packages: Defining Interfaces - Extending Interfaces - Implementing Interfaces - Accessing Interface Variables - Creating Packages - Accessing a Package - Using a Package - Adding a Class to a Package - Java API Packages - Using System Packages - Naming Conventions.

UNIT IV:

Multithreaded Programming: Creating Threads - Extending the Thread Class - Life cycle of Thread - Using Thread Methods - Thread Exceptions - Thread Priority – Synchronization - Implementing the Runnable Interface - Inter-Thread Communication.

Managing Errors and Exceptions: Types of Errors – Exceptions - Syntax of Exception Handling Code - Multiple Catch Statements - Using Finally Statements - Throwing Our Own Exceptions - Using Exceptions for Debugging.

UNIT V:

Event Handling: Events - Event Sources - Event Classes - Event Listeners - Delegation Event Model - Handling Mouse and Keyboard Events - Adapter Classes - Inner Classes.

AWT: The AWT Class Hierarchy - User Interface Components- Labels – Button – Canvas – Scrollbars - Text Components - Check Box - Check Box Groups – Choices - Lists Panels

– Scroll Pane – Dialogs - Menu Bar – Graphics - Layout Manager – Layout Manager Types.
Applets: Building Applet Code – Applet Life cycle – Creating an Executable Applet – Designing Web Page – Applet Tag – Adding Applet to HTML File – Running the Applet.

Outcomes:		

1. Understands the basics of java programming.
2. Understands the concepts of object orientation methods and inheritance using java.
3. Obtain the overview of interfaces and java API.
4. Gains knowledge on multithreading and exception handling in Java.
5. Able to design GUI using applets.

Text Book:		

Programming with java, E. Balagurusamy, TATA Mcgraw Hill.

Reference Books:		

1.Head First Java 2nd edition, Kathy Sierra and Bert Bates. Orielly Publications
2.The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc (CS)-Semester I

OPERATING SYSTEMS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1.To learn about fundamentals, functions, types of operating systems and processes communication.
2.To learn the mechanisms of OS to handle processes, Knowledge towards Processes Synchronization and gain knowledge on deadlock detection algorithms.
3. To provide the knowledge towards memory management algorithms, virtual memory and Secondary storage structure.
4. To learn about Unix advanced Commands and Bourne Shell commands.

SYLLABUS

UNIT-I:

Introduction: Introduction to Operating Systems-Computer-System Organization-Computer-System Architecture-Operating-System Structure-Operating-System Operations. System Structure: Operating- System Services-User Operating-System Interface-System Calls- Types of System Calls- System Boot. **Process Concepts**: Process Concept-Process Scheduling. Operations on Processes- Inter Process Communication.

UNIT-II:

Process Scheduling: Basic Concepts-Scheduling Criteria-Scheduling-Algorithms. **Process Synchronization:** Background-The Critical-Section Problem-Peterson's Solution-Synchronization Hardware-Semaphores-Classic Problems of Synchronization-Monitors. **Deadlocks:** System Model-Deadlock Characterization-Methods for Handling Deadlocks-Deadlock Prevention-Deadlock Avoidance-Deadlock Detection-Recovery from Deadlock.

UNIT-III:

Memory Management: Background-Swapping-Contiguous Memory Allocation-Paging-Structure of the Page Table-Segmentation. **Virtual Memory Management**: Background-Demand Paging-Copy-on-Write-Page Replacement- Allocation of Frames-Thrashing.

UNIT-IV:

File System Interface: File Concept-Access Methods-Directory and Disk Structure. **Implementing File Systems:** File-System Structure-File-System Implementation-Allocation Methods. **Secondary Storage Structure**: Overview-Disk Structure-Disk Scheduling.

UNIT-V:

Unix: History of Unix-Features of Unix System- Structure of Unix System- Introduction to Unix File System- Organization and Structure of File Systems- Basic and Advanced Unix Commands-Visual Editor. **Bourne Shell Programming:** Features-Bourne Shell Scripting: echo, variables, expr, let, base conversion, factors, UNITs, reading input, if statement, **Loops**: for, while, until.

Outcomes:

1. To familiarize with the fundamentals and different types of operating systems.
2. To learn the concepts of Process Scheduling, processes synchronization and CPU Scheduling.
3. To acquaint knowledge about Deadlocks and memory management.

4. To study the concept of Disk Scheduling, Disk Management and Security issues.
5. To practice Unix File system, advanced commands and Shell programming.

Text Books:		

1.Operating System Concepts-8th edition-Abraham Silber schatz-Peter Galvin-Grey Gagne-John Wiley& Sons.
2. Unix and Shell Programming-B.M.Harwani-Oxford.

Reference Books:

1.Dhamdhere (IInd Revised Edition)-System Programming and Operating Systems & System Programming-Tata McGraw Hill.
2. Unix Shell Programming BPB Yashawant kanetkar.
3.Modern Operating Systems-A. S Tanenbaum Pearson/PHI latest Edition.
4. Operating Systems -William Stallings-PHI latest Edition.

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc (CS)-Semester I

ADVANCED DATA STRUCTURES USING JAVA LAB

Credits: 1.5	**Lab: 3 Hours**	**Tutorials: -**
Max Marks: 100	**External: 50 Marks**	**Internal: 50 Marks**

Course Objectives:

1. To implement stacks and queues using arrays and linked lists.
2. To develop programs for searching and sorting algorithms.
3. To write programs using concepts of various trees.
4. To implement programs using graphs.

SYLLABUS

Cycle I:

1. List ADT implementation using arrays.
2. Implementation of Stacks using Arrays.
3. Evaluation of postfix Expression.

Cycle II:

1.Queues using arrays.
2.Circular queue using arrays.
3.Implementation of single Linked Lists.
4.Stacks and Queues using Single Linked Lists.
5.Implementation of a Dequeue.

Cycle III:

1.Binary Tree Traversals using Recursion.
2.Binary Search Tree-insertion, deletion, and traversing.
3.BFS and DFS Graph traversals.
4.Implementation of AVL Trees
5.Implementation of B-Trees
6.Implementation of B+Trees
7.Dictionary ADT implementation**.**

Cycle IV:

1.Insertion sort, Selection sort, and Bubble sort.
2.Quick sort and Merge sort.
3.Linear search and Binary search

Outcomes:

1. Practice applications of stacks and queues.
2. Able to write programs to implement linked list.
3. Practice implementation of various searching and sorting techniques.
4. Implementation of TREES and GRAPHS.
5. Exhibit applications using data structures.

Text Book:

Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Edition.

Reference Book:

The Complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt TMH

MSCS 1.1.7

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester I

COMPUTER ORGANIZATION LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	External: 50 Marks	Internal: 50 Marks

Course Objectives:

1. To learn the about logic gates, half adders, full adders and flip -flops.
2. To learn about the microprocessor programming.
3. To learn about the microprocessor interfacing with stepper motor, R-2R ladder.
4. To develop the skill in writing microprocessor programming.

SYLLABUS

DIGITAL EXPERIMENTS

1. Verification of truth tables of Logic Gates
2. TTL characteristics, Verification of Demorgan's Laws
3. Implementation of Adders and Subtractors
4. Verification of Flip-Flops (RS- JK- D- T)
5. Design of 3-to-8 Decoder, Encoder
6. Multiplexer, De-Multiplexer

8085 ASSEMBLY LANGUAGE PROGRAMMING

7. Clears a Memory Location
8. To Move the Contents in one memory Location to Another
9. To Exchange the contents in Memory location
10. To Find the Sum of Two Numbers
11. To Transfer a Value from one Memory to Another (Indirect Mode)
12. To Exchange the contents in two Memory Locations (Indirect Mode)
13. To Add 2-8 Bits Store Result in 16-Bit (Indirect Mode)
14. To Find largest of 2-8 Bit NO's
15. To Find Smallest of 2-8 Bit NO's
16. To Add 2-16 bits Store Result in 32-Bit
17. To Find the Sum of Series of 8-bit and result in 16-Bit
18. To Determine a NO. Is Even or Odd
19. To Count NO. Of 1's in a given Byte
20. To find 2's Complement of a given NO.
21. To Multiply Two 8-Bit No.'s
22. To Perform Division of 2-8 Bit No's
23. To Find Factorial of a Given Number
24. To add 2-8Bit Numbers with Carry
25. To Shift Left One-Bit

Outcomes:

1. The student understands and learns the applications of Digital logic design.
2. The student understands and learns the concept of memory design.
3. The student understands and learns the concept of data interpretation.
4. The student understands and learns the concept of data transmission.
5. The student develops the skill of writing microprocessor programming.

Text Books:		
1. Computer System Architecture, M. Morris Mano, Third Edition, Pearson Education, 2007. 2. Computer Systems Organization & Architecture, John D. Carpinelli, Pearson Education, 2001.		
Reference Books:		
1.Digital Logic and Computer Organization, V. Rajaraman and T.Radhakrishnan, PHI Publication, 2006. 2.Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGrawHill. 3.Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi, Springer Int.Edition.		

MSCS 1.1.8

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester I

OPERATING SYSTEMS LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	External: 50 Marks	Internal: 50 Marks

Course Objectives:

1. To familiarize the students with the Architecture of UNIX Operating System.
2. To learn the mechanisms of CPU Scheduling and Deadlock Detection algorithms.
3. To learn mechanisms of Processes synchronization using semaphores.
4. To familiarize students on UNIX System Calls and shell programming

SYLLABUS

Cycle-1:

1. Write programs using the system calls of UNIX operating system.
2. UNIX Shell Programming.

Cycle -2:

1. Programs to simulate process scheduling like FCFS- SJF and Round Robin.
2. Programs to simulate page replacement algorithms like FIFO- Optimal and LRU.
3. Programs to simulate deadlock detection.
4. Implement the Producer – Consumer problem using semaphores.

Cycle -3:

1. Implement the Producer-Consumer Program using Semaphores.
2. Implement Paging memory management scheme.
3. Implement any file allocation technique (Linked-Indexed-Contiguous).

Outcomes:

1. To differentiate the command set of MS Dos and UNIX.
2. To familiarize with shell programming and shell commands.
3. To practice the concepts of programs using system calls.
4. To implement CPU Scheduling and Deadlock Algorithms.
5. To implement Page replacement algorithms.

Text Books:

1. Unix Systems Programming: Communication-Concurrency and Threads- Kay Robbins-
2. Edition- Pearson Education
3. Unix concepts and applications-Sumitabha Das- TMH Publications.
4. Unix programming- Stevens- Pearson Education.
5. Shell programming-Yashwanth Kanetkar.
6. Operating System Concepts-Silberschatz- and Peter Galvin.
7. Beginning Android 4 Application Development by Wei-Meng Lee-Wiley India Pvt Ltd.

MASTER OF SCIENCE IN COMPUTER SCIENCE

Syllabi

With effect from 2023-24 admitted batch

I YEAR II SEMESTER

II Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS1.2.1	Web Programming	4	-	60	40	100	4
MSCS1.2.2	Data Base Management Systems	4	-	60	40	100	4
MSCS1.2.3	Artificial Intelligence	4	-	60	40	100	4
MSCS1.2.4	Computer Networks	4	-	60	40	100	4
MSCS1.2.5	Formal Languages and Automata Theory	4	-	60	40	100	4
MSCS1.2.6	**Elective – I:** (i) Image Processing (ii)Information Retrieval System (iii) Design and Analysis of Algorithms	4	-	60	40	100	4
MSCS1.2.7	**Open Elective -I**	4		60	40	100	4
MSCS1.2.8	Web Programming Lab	-	3	50	50	100	1.5
MSCS1.2.9	Data Base Management Systems Lab	-	3	50	50	100	1.5
MSCS1.2.10	Computer Networks Lab	-	3	50	50	100	1.5
Total		**28**	**9**	**570**	**430**	**1000**	**32.5**

MSCS 1.2.1

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

WEB PROGRAMMING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. Understand the principles of Web based application development and designing dynamic content in web pages using Java Script and XML
2. Understanding the concepts of client server communication using servlets.
3. Understanding the concept of java Server Pages and design applications using them.
4. Understand the concepts of Component development and design applications by establishing connections to Databases.
5. Understand the concepts of PHP and AJAX and their applications

SYLLABUS

UNIT-I:

HTML Common tags: Introduction – List – Tables – Images – Forms – Frames - Cascading Style sheets - Introduction to Java Scripts - Objects in Java Script – Dynamic HTML with Java Script. **XML**: Introduction - Document type definition - XML Schemas - Document Object model - Presenting XML - Using XML Parsers: DOM and SAX.

UNIT-II:

Web Servers and Servlets: Tomcat web server - Introduction to Servlets - Lifecycle of a Servlet – JSDK - The Servlet API - The javax.servlet Package - Reading Servlet parameters - Reading Initialization Parameters - The javax.servlet HTTP package - Handling Http Request & Responses - Using Cookies-Session Tracking - Security Issues.

UNIT-III:

Introduction to JSP: The Problem with Servlet - The Anatomy of JSP Page – JSP Processing - JSP Application Design with MVC Architecture - Setting Up and JSP Environment - Installing the Java Software Development Kit - Tomcat Server & Testing Tomcat - JSP Application Development - Generating Dynamic Content - Using Scripting Elements - Implicit JSP Objects.

UNIT-IV:

Database Access: Database Programming using JDBC - Studying javax.sql. * package - Accessing a Database from a JSP Page - Application–Specific Database Actions - Deploying JAVA Beans in a JSP Page - Introduction to struts framework.

UNIT-V:

PHP and AJAX:PHP Basic Syntax, defining variable and constant, PHP Data type, Operator and Expression; **Handling Html Form with PHP**: Capturing Form Data, Dealing with Multi-value filed, Generating File uploaded form, redirecting a form after submission; Decisions and loop; Function; Strings; Arrays; AJAX: Introduction to AJAX, AJAX Technologies, AJAX Examples, Steps of AJAX operations, XML HttpRequest Methods, AJAX Database operations.

Outcomes:		
1. To Construct web-based applications using Java script and XML. 2. To learn design application using java Servlets, java Server Pages. 3. To understand application design in JSP. 4. To practice design applications using database connectivity. 5. To acquire the basic concepts of PHP and AJAX.		
Text Books:		
1. Web Programming- building internet applications- Chris Bates 2nd edition- WILEY Dreamtech. 2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Scheldt. TMH. 3. Java Server Pages –Hans Bergsten- SPD O'Reilly.		
Reference Books:		
1. Web Technologies by Y.Ramesh Babu- Overseas Publishers Pvt.Ltd. 2. Programming world wide web-Sebesta- Pearson. 3. Core Servlets and Javaserver Pages Volume1: Core Technologies by Marty Hall and Larry Brown Pearson. 4. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia. 5. Jakarta Struts Cookbook- Bill Siggelkow- S P D O'Reilly for chap-8. 6. Murach's beginning JAVA JDK 5- Murach- SPD. 7. Professional PHP4, Luis Argerich, WROX, SDP.		

MSCS 1.2.2

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

DATABASE MANAGEMENT SYSTEMS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models.
3. To understand and use data manipulation language to query, update, and manage a database.
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, and concurrency.
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

SYLLABUS

UNIT-I:

Overview of Database systems: History- File system verses DBMS-Advantages of DBMS-describing and storing of data-Transaction management-structure of DBMS-People who work with DBMS. **Introduction to Database Design**: Design-ER diagrams-Beyond ER Design-Entities-Attributes and Entity Sets-Relationships and Relationship sets- Additional features of ER Model-Conceptual Design with the ER Model-Conceptual Design for Large enterprises. **Relational Model:** Introduction to the Relational Model – Integrity Constraints Over Relations-Enforcing Integrity Constraints-Querying relational data- Logical data base Design-Introduction to Views – Destroying/altering Tables and Views.

UNIT-II:

Relational Algebra and Calculus: Relational Algebra – Selection and Projection-Set Operations-Renaming-Joins-Division-Examples of Algebra Queries-Relational calculus – Tuple relational Calculus – Domain relational calculus. **Form of Basic SQL Query**: Examples of Basic SQL Queries- Introduction to Nested Queries- Correlated Nested Queries- Set – Comparison Operators-Aggregate Operators-NULL values – Comparison using Null values – Logical connectives – Impact on SQL Constructs- Outer Joins-Disallowing NULL values- Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT-III:

Introduction to Schema Refinement: Problems Caused by redundancy- Decompositions – Problem related to decomposition-Functional Dependencies - Reasoning about FDS-Normal Forms –BCNF –Properties of Decompositions- Loss less- join Decomposition-Dependency preserving Decomposition-Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form-Join Dependencies-FIFTH Normal Form-Inclusion Dependencies.

UNIT-IV:

Overview of Transaction Management: The ACID Properties-Transactions and Schedules-Concurrent Execution of Transactions – Lock Based Concurrency Control. **Concurrency Control**: Serializability and recoverability – Introduction to Lock Management – Lock Conversions-Dealing with Dead Locks-Specialized Locking Techniques – Concurrency Control without Locking.

UNIT-V:		
Crash recovery: Introduction to Crash recovery- Introduction to ARIES-the Log -Other Recovery related Structures- the Write-Ahead Log Protocol-Check pointing-recovering from a System Crash-Media recovery. **Security and Authorization:** Introduction to Database Security-Access Control- Discretionary Access Control.		
Outcomes:		
1. To understand various database models. 2. To imbibe querying techniques in Entity Relation model. 3. To practice optimization of database design with Normalization. 4. To familiarize with the concepts of Serializability and Concurrency control. 5. To gain knowledge on and crash recovery and the Database Security.		
Text Book:		
Database Management Systems- Raghu Ramakrishnan- Johannes Gehrke- TMH- 3rd Edition-2003.		
Reference Books:		
1. Introduction to Database Systems-C.J. Date-Pearson Education. 2. Data base System Concepts- A. Silberschatz-H.F. Korth- S. Sudarshan-McGraw hill- VI edition-2006. 3. Fundamentals of Database Systems 5th edition. -Ramez Elmasri- Shamkant B.Navathe- Pearson Education-2008.		

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

ARTIFICIAL INTELLIGENCE

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1.The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence that includes problem characteristics, Searching Techniques.

2. To learn about Issues and variations, advanced systems in knowledge representations.

3. To derive the logics, reasoning and statistical analysis.

4. To study the concepts of Expert Systems

5. To understand the basic functions and characteristics of artificial neural networks.

SYLLABUS

UNIT-I:

Introduction: What is Artificial Intelligence, The AI Problem, The Underlying Assumptions, what is an AI technique, The Level of the Model, Criteria for Success? Problem, Problem Spaces and Search: Defining Problem at a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics and Issues in design of search programs. Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-First-Search, A* & AO * Algorithms, Constraint Satisfaction, Means-End-Analysis.

Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation. Representing knowledge using Rules: Procedural versus Declarative knowledge, Logic Programming, forward versus backward reasoning, matching, control knowledge. Weak Slot and Strong Slot Filler Structures: Semantic nets, Frames, Conceptual Dependency, Scripts.

Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction. Symbolic Reasoning under uncertainty: Introduction to Non-monotonic Reasoning, Logics of Non-monotonic Reasoning, Statistical Reasoning: Probability and Bay's theorem, Certainty factors and rule-based systems, Bayesian Networks, Dumpster-Shafer Theory.

Expert Systems: Introduction, Rule Based Expert System Architecture, Non-Production System Architecture, Dealing with Uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Rules.

Neural Networks: Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem: Applications and Characteristics

Outcomes:		
1. To understand the techniques and applications of Artificial Intelligence. 2. To familiarize with key issues and advanced knowledge representations. 3. To obtain the knowledge on the representation of the language sentences using predicate logic. 4. To gain awareness about expert system. 5. To develop knowledge on neural network models.		
Text Books:		
1.Artificial Intelligence, 2nd Edition, E. Ritch and K.Knight (TMH). 2.Introduction to Artificial Intelligence and Expert Systems – Dan Watterson – Pearson Education –L.P. E		
Reference Books:		
1.Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/Pearson Education. 2.Artificial Neural Networks B. Yagna Narayana, PH.		

MSCS 1.2.4

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

COMPUTER NETWORKS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To provide a solid foundation of the basics of data communication.
2. To prepare students to know the characteristics and designs of types of computer networks and their applications
3. Learn how computer network hardware and software operate
4. Investigate the fundamental issues driving network design
5. Learn about dominant network technologies.

SYLLABUS

UNIT-I:

Introduction: Study of Data Communications-Data Communication- Networks-Protocols and Standards-Standards Organizations-**Basic Concepts: L**ine Configuration Topology-Transmission mode Categories of Networks - Internetworks-T**he OSI Model**: The Model-Functions of the layers-TCP/IP Protocol Suite. **Encoding and Modulating**: Digital-to-Digital conversion-Analog-to-Digital conversion Digital-to-Analog conversion Analog-to-Analog conversion.

UNIT-II:

Transmission Media: Guided Media-Unguided Media-Transmission Impairment. **Error Detection and Correction:** Types of Errors-Detection- Vertical Redundancy Check (VRC) -Longitudinal Redundancy- Check (LRC) -Cyclic Redundancy Check (CRC) -Checksum-Error Correction-**Data Link Control: L**ine Discipline-Flow Control-Error control. **Local Area Networks:** Project 802-Ethernet-Other Ethernet networks-Token bus -Token Ring-

UNIT-III:

Switching: Circuit Switching-Packet Switching-Message switching.
Point-to-Point Protocol (PPP): transition states-PPP layers- Link Control Protocol (LCP)-Authentication Network Control Protocol (NCP)-**Frame Relay:** Introduction-Frame relay operation-Frame relay layers Congestion Control-Leaky Bucket Algorithm-Traffic Control.

UNIT-IV:

Networking and Internetworking Devices: Repeaters - Bridges-Routers- Gateways – Other devices -Routing Algorithms -Distance Vector Routing-Link State Routing-**Transport Layer:** Duties of the Transport Layer-Connection-The OSI Transport Protocol. **Upper OSI Layers: S**ession Layer-Presentation Layer-Application Layer-**TCP/IP Protocol Suite: Part 1:** Overview of TCP/IP-Network Layer-Addressing-Subnetting-Other protocols in the network layer-Transport Layer.

UNIT-V:

TCP/IP Protocol Suite: Part 2- Application Layer: Client–Server Model-Bootstrap Protocol (bootp) and Dynamic Host-Configuration protocol (DHCP) -Domain Name System (DNS)-Telnet-File Transfer Protocol (FTP) -Trivial File Transfer Protocol (TFTP)-Simple Mail Transfer Protocol (SMTP)-Simple Network Management Protocol (SNMP)-Hypertext Transfer Protocol (HTTP)-World Wide Web (WWW).

Outcomes:		
1. To understand the overview of Data Communications and Networks. 2. To analyze the study on physical and data link layers. 3. To familiarize with frame formats of data link layer. 4. To gain knowledge about network and transport layer functionalities. 5. To learn practical applications of networks.		
Text Book:		
Data Communications and Networking- Behrouz A. Forouzan- 2nd Edition revised- Tata Mcgraw- Hill Publishing Co.		
Reference Books:		
1.Understanding Data Communications and Networks- William A Shay- 2nd Edition- Vikas Publishing House. 2.Computer Networks- Andrew S. Tanenbaum- Pearson Education- Low Price- 4th Edition. 3.Data and Computer Communications- Williams Stallings- Prentice-Hall India- Eastern Economy Edition- 7thedition. 4.Data Communications- Computer Networks and Open Systems- Fred Halsall- Pearson Education- Low Price- Edition- 4th edition- 2001.		

MSCS 1.2.5

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

FORMAL LANGUAGES AND AUTOMATA THEORY

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. Understand basic properties of Deterministic and Nondeterministic Finite Automata.
2. Understand basic properties of Languages, Grammars, Normal forms and difference between types of languages and types of automata.
3. Understand Pushdown Automata and Turing Machines, concepts of tractability and decidability, concepts of NP-Completeness and NP-Hard problems.
4. Understand the challenges of Theoretical computer science and its contribution to other sciences.

SYLLABUS

UNIT- I:

Theory of Automata: Definition and Description of an Automaton-Transition Systems-Properties and Acceptance of a String by Automaton-Deterministic Finite Automata (DFA) and Nondeterministic Finite State Automata (NDFA)-Equivalence of DFA and NDFA-Mealy and Moore Models-Minimization of Finite Automata.

UNIT- II:

Formal Languages: Basic Definitions and Examples-Grammar and Types of Grammar-Language and Chomsky classification of Languages- Language generated by Grammar-Grammar generated by Language-Operations on Languages-Languages and Automata. **Regular Sets and Regular Grammar:** Regular Expressions-Finite Automata and Regular Expressions-Pumping Lemma for Regular Sets-Application of Pumping Lemma-Closure properties of Regular Grammar.

UNIT- III:

Context-Free Languages: Context-Free Languages (CFL) and Derivation Trees-Ambiguity in Context-Free Grammars (CFG)-Simplification of CFG-Normal Forms for CFG-Pumping Lemma for CFL-Closure Properties of CFL-Decision Algorithms for CFL. **Pushdown Automata:** Definition-Acceptance of PDA-Context-free Languages-Parsing.

UNIT- IV:

Turing Machines: Definition and Model-Representing of Turing Machines-Language Acceptability by Turing Machine-Design and Description of Turing Machine-Techniques and Variants of Turing Machine.

UNIT- V:

Decidability and Recursively Enumerable Languages: Decidability-Decidable and Undecidable Languages-Halting Problem of TM-Post Correspondence Problem-Godelization. **Computability and Complexity:** Basic Concepts-Primitive Recursive Functions-Recursive Functions-Partial Recursive Functions.

Outcomes:

1. Familiarizes with various types of Finite Automata.
2. Understand the types of Grammar and Regular expressions.
3. Learn the concepts of Context Free Language, Normal Forms and Pushdown Automata.
4. Ability to construct Turing machines and apply on its applications.
5. Optimize computability using Recursive functions.

Text Book:		

Theory of Computer Science, K.L.P. Mishra & N.Chandrasekaran, Third Edition, Prentice Hall of India Private Limited.

Reference Books:		

1. Elements of Theory of Computation, Harry R Lewis & Cristos H. Papadimitriou, Pearson Education/Prentice Hall of India Privated Limited.
2. Introduction to Automata theory, Languages& Computation, Hopcroft.J. E and J.D.Ullman, Addision-Wesely, Mass 1979.

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

[Elective – I]

IMAGE PROCESSING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To explain fundamentals of Image processing concepts.
2. To provide mathematical foundation of image enhancement, image compression and image segmentation.
3. To explain the students about Morphology and its applications in image processing.
4. To explain various methods and techniques for image transformation.

SYLLABUS

UNIT I:

Fundamental steps in Image Processing-Elements of Digital image processing systems-Digital image fundamentals. Uniform and Non-uniform sampling and quantization. Some basic relationships between pixels-Imaging Geometry.

UNIT II:

Image enhancement (in spatial domain and frequency domain): Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters. Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters.

UNIT III:

Image compression: Definition- A brief discussion on – Run length encoding, contour coding, Huffman code, compression due to change in domain, compression due to quantization Compression at the time of image transmission. Brief discussion on Image Compression standards.

UNIT IV:

Image Segmentation: Definition, characteristics of segmentation. Detection of Discontinuities, Thresholding Pixel based segmentation method. Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram-based segmentation, spilt and merge technique. Use of motion in segmentation (spatial domain technique only). **Morphology:** Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms.

UNIT V:

Image Transforms – Introduction to Fourier Transform-DFT- Some properties of 2-D Fourier Transform-FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform.

Outcomes:

1. Understands the fundamentals of Image processing concepts.
2. Ability to understand various image enhancement techniques.
3. Acquires mathematical foundation on compression techniques image enhancement.
4. Familiarizes with various methods of image segmentation and morphology.
5. Gains knowledge on image transformation techniques.

Text Book:

Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Education,2002.		
Reference Books:		
1.Fundamentals of Digital Image processing – A.K. Jain, PHI. 2.Digital Image processing using MATLAB – Rafael C. Gonzalez, Richard EWoods and Steven L Edition, PEA,2004. 3.Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.		

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

[Elective – I]

INFORMATION RETRIEVAL SYSTEM

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To explain fundamentals of Domain Analysis of IR systems concepts.
2. To Know the Techniques for Inverted Files.
3. To explain the New Indices for Text.
4. To explain various methods and techniques for String Searching Algorithms.

SYLLABUS

UNIT I:

Introduction to Information storage and retrieval systems: Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation. **Introduction to Data structures and algorithms related to Information Retrieval**: Basic Concepts, Data structures, Algorithms.

UNIT II:

Inverted Files: Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques. **Signature Files**: Introduction, Applications and Concepts of Signature files.

UNIT III:

New Indices for Text: PAT Trees: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees, PAT Arrays. **Lexical Analysis and Stoplists**: Introduction, Lexical Analysis, Stoplists.

UNIT IV:

Stemming Algorithms: Introduction, Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Inverted Files. **Thesaurus Construction**: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

UNIT V:

String Searching Algorithms: Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

Outcomes:

1.Understands the fundamentals of Information storage and retrieval systems.

2. Ability to understand various concepts of Signature files.

3.Gains knowledge about PAT Trees and Lexical Analysis and Stoplists.

4.Acquires knowledge on Thesaurus Construction.

5.Familiarizes with various String Searching Algorithms.

Reference Books:		
1. Modern Information Retrieval, Ricardo Baeza-Yates, Neto, PEA,2007. 2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000. 3. Information Retrieval: Algorithms and Heuristics, Grossman, Ophir Frieder, 2/e, Springer, 2004. 4. Information Retrieval Data Structures and Algorithms, Frakes, Ricardo Baeza-Yates, PEA 5. Information Storage and Retieval, Robert Korfhage, John Wiley & Sons. 6. Introduction to Information Retrieval, Manning, Raghavan, Cambridge University Press.		

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

[Elective – I]

DESIGN AND ANALYSIS OF ALGORITHMS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To learn mathematical background for analysis of algorithm.
2. To learn various advanced data structures.
3. To understand the concept of designing an algorithm.
4. To understand the solution of problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, branch and bound and NP Hard and completeness problems and writing programs for these solutions.

	SYLLABUS	
Unit I:		

Introduction: Fundamentals of algorithmic problem solving – important problem types – fundamental data structures. Fundamentals of analysis of algorithms and efficiency – Analysis framework – Asymptotic Notations and Basic Efficiency classes – Mathematical Analysis of Non-recursive Algorithms –Mathematical Analysis of recursive Algorithms – Empirical Analysis of Algorithms – Algorithm Visualization. Brute Force – Selection Sort and Bubble sort – Sequential Search and Brute – Force String Matching – Closest Pair and Convex-Hull
Problems by Brute Force – Exhaustive Search

Unit II:

Divide-and-Conquer: Merge sort – Quicksort – Binary Search – Binary Tree Traversals and Related Properties – Multiplication of large integers and Strassen's Matrix Multiplication – Closest- Pair Convex-Hull Problems by Divide- and – Conquer, Decrease – and – Conquer: Insertion Sort – Depth-First Search and Breadth-First Search-Topological Sorting – Algorithms for Generating Combinatorial Objects – Decrease-by-a-Constant-Factor Algorithms – Variable-Size-Decrease Algorithms

Unit III:

Transform-and-Conquer: Presorting – Gaussian Elimination – Balanced Search Trees – Heap and Heapsort – Horner's Rule and Binary Exponentiation – Problem Reduction, Space and Time Tradeoffs: Sorting by Counting – Input Enhancement in string Matching –Hashing – B-Trees

Unit IV:

Dynamic Programming: Computing a Binomial Coefficient – Warshall's and Floyd's Algorithm– Optimal Binary Search Trees – The Knapsack Problem and Memory Functions.
Greedy Technique: Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Trees.

Unit V:

Limitations of Algorithm Power: Lower-Bound Arguments – Decision Trees – P, NP and NP – complete problems – Challenges of Numerical Algorithms
Coping with the Limitations of Algorithms: Power – Backtracking – Branch-and-Bound – Approximation Algorithms for NP-hard Problems – Algorithms for solving Nonlinear Equations.

Outcomes:		
1. Understands the algorithmic efficiency, asymptotic notations and brute force techniques. 2.Familiarize with divide and conquer strategy for several applications. 3. Learns the techniques of transform and conquer. 4.Develops knowledge on dynamic programming and greedy technique for real timeapplications. 5. Analyze the limitations of algorithms.		
Text Book:		
Introduction to Design & Analysis of Algorithms by AnanyLevitin, Pearson Education, New Delhi, 2003		
References:		
1. Fundamentals of Computer Algorithms, Horowitz and Sahni, Galgothia publications. 2. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest & Clifford Stein, Prentice Hall of India, New Delhi, New Delhi. 3. The Design and Analysis of computer Algorithms, Aho, Hopcroft& Ullman, Pearson Education, New Delhi, 2003 4. Fundamentals of algorithmics, Gilles Brassard & Paul Bratley, Prentice Hall of India, New Delhi.		

MSCS 1.2.7

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc(CS)-Semester II

Open Elective I

MSCS 1.2.8

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

WEB PROGRAMMING LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	External: 50 Marks	Internal: 50 Marks

Course Objectives:

1. Understand the principles of Web based application development.
2. Design dynamic content in Web Pages using JavaScript and XML.
3. Understanding the concepts of java Servlets, java Server Pages and design applications using them.
4. Understand the concepts of Component development and design applications by establishing connections to Databases.
5. Understand the concepts of PHP and design applications.

SYLLABUS

1. Introduction:
   - Introduction to HTML
   - Introduction to Java Script
   - Introduction to XML
2. Feedback Form using HTML tags
3. Develop Web-site using only HTML Tags and Cascading style sheets
4. DHTML Programs
   - 4.1 Color Picker
   - 4.2 Rollover Buttons
5. Java Script Programs
6. XML Programs
7. Installation and Running of Tomcat Server
8. Servlet Programs
   - 8.1 Displaying simple text
   - 8.2 Validating user's login information by parameter passing
   - 8.3 Handling http request and response
   - 8.4 Handling cookies
   - 8.5 Session tracking
9. JSP Programs
   - 9.1 Displaying simple text
   - 9.2 Validating user's information by conditional processing
   - 9.3 Session tracking
10. PHP Programs
    - 10.1 Displaying simple text
    - 10.2 Validating user's information by conditional processing

Outcomes:

1. To develop web-based applications using Java script and XML.
2. To design applications using java Servlets, java Server Pages.
3. To learn the connectivity of java programs to different databases.
4. To structure applications using PHP.

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

DATABASE MANAGEMENT SYSTEMS LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	External: 50 Marks	Internal: 50 Marks

Course Objectives:

1. The major objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to the participants to groom them into well- Informed database application developers.
2. To present SQL and procedural interfaces to SQL comprehensively.
3. To present the concepts and techniques relating to query processing by SQL Engines.
4. To understand and use data manipulation language to query, update, and manage a Database.
5. To present the concepts and techniques relating to ODBC and its Implementations.
6. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

SYLLABUS

Cycle-I:

1. Creation- altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub-Queries) using ANY- ALL- IN- EXISTS- NOTEXISTS- UNION-
INTERSET- Constraints. Example: - Select the roll number and name of the student who secured fourth rank in the class. Queries using Aggregate functions (COUNT- SUM- AVG- MAX and MIN)- GROUP BY- HAVING and Creation and dropping of Views.
3. Queries using Conversion functions (to_char- to_number and to_date)- string functions (Concatenation- lpad- rpad- ltrim- rtrim- lower- upper- initcap- length- substr and instr)- date
functions (Sysdate- next_day- add_months- last_day- months_between- least- greatest- trunc-
round- to_char- to_date).

Cycle-II:

1. Creation of simple PL/SQL program which includes declaration section- executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found).
2. Insert data into student table and use COMMIT- ROLLBACK and SAVEPOINT in PL/SQL block.
3. Develop a program that includes the features NESTED IF- CASE and CASE expression.

Cycle-III:

1.Program development using WHILE LOOPS- numeric FOR LOOPS- nested loops using ERROR Handling- BUILT–IN Exceptions-USE defined Exceptions-RAISE-APPLICATION ERROR.
2. Program’s development using creation of procedures- passing parameters IN and OUT of

PROCEDURES.

3. Program development using creation of stored functions- invoke functions in SQL Statements and write complex functions.

Cycle-IV:		

1. Develop programs using features parameters in a CURSOR- FOR UPDATE CURSOR- WHERE CURRENT of clause and CURSOR variables.

2. Develop Programs using BEFORE and AFTER Triggers- Row and Statement Triggers and

INSTEAD OF Triggers.

Mini Project

Outcomes:		

1. To practice DDL, DML, DCL commands.
2. To design and implement a database schema for a given problem-domain and normalize a database.
3. To declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
4. To learn PL/SQL programming.
5. To familiarize with database connectivity.

MSCS 1.2.10

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester II

COMPUTER NETWORKS LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	External: 50 Marks	Internal: 50 Marks

Course Objectives:

1. Build an understanding of the fundamental concepts of computer networking.
2. Preparing the student for Advanced courses in computer networking.
3. Allow the students to gain expertise in some specific tools of Networking.
4. Allow the students to gain expertise in some specific Networking Simulators.

SYLLABUS

Week 1: Study of Network Devices in Detail.

Study of Different Types of Network Cables - **Cross Cable, Straight Cable**

Week 2: Study of Basic Network Oriented Commands

Study Classification of IP Addresses

Week 3: Study of **Subnetting**

Week 4: Configure a Network Topology Using **CISCO Packet Tracer**

Week 5: Study of Routing Protocols **RIP, OSPF**

Week 6: Study of Protocols **IPV6, DHCP**

Week 7: Study of **Client Server Configuration** using Packet Tracer

Week 8: Socket Programming **TCP Sockets**

Week 9: Protocol Analysis of TCP using **TTCP tool.**

Week 10: Protocol Analysis of TCP using **Wire Shark Tool**

Outcomes:

1. To understand the difference between serial communication and parallel communication with direct cable software component.
2. To learn the importance of Dialup networking and HyperTerminal.
3. To understand the concepts of different network configurations using star Topology.
4. To acquire knowledge on Cisco-packet tracer simulator by configuring the different applications.
5. To practice socket programming using TCP and UDP.

MASTER OF SCIENCE IN COMPUTER SCIENCE

Syllabi

With effect from 2023-24 admitted batch

II YEAR I SEMESTER

III Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS2.1.1	Object Oriented Analysis and Design with UML	4	-	60	40	100	4
MSCS2.1.2	Network security	4	-	60	40	100	4
MSCS2.1.3	Data Warehousing and Data Mining	4	-	60	40	100	4
MSCS2.1.4	Python Programming	4	-	60	40	100	4
MSCS2.1.5	**Elective – II:** (i)Data Science (ii) Cloud Computing (iii) Internet of Things(IoT)	4	-	60	40	100	4
MSCS2.1.6	**Open Elective – II**	4	-	60	40	100	4
MSCS2.1.7	Python Programming Lab	-	3	50	50	100	1.5
MSCS2.1.8	OOAD Lab	-	3	50	50	100	1.5
Total		**20**	**6**	**460**	**340**	**800**	**23**

MSCS 2.1.1

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester III

OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1.To understand the importance and basic concepts of object-oriented modeling.
2.To specify, analyze and design the use case driven requirements for a particular system.
3.To model the event driven state of object and transform them into implementation specific layouts.
4.To Identify, Analyze the subsystems, various components and collaborate them interchangeably.

SYLLABUS

UNIT-I:

Object-Oriented Systems Development Life Cycle: Introduction-The Software Development Process-Building High-Quality Software-Object-Oriented Systems Development - A Use-Case Driven Approach-Object-Oriented Analysis - Use-Case Driven-Object-Oriented Design-Prototyping-Implementation: Component- Based Development-Incremental Testing.

UNIT-II:

Object-Oriented Methodologies: Introduction-Rumbaugh Modeling Technique-The Booch Methodology-The Jacobson Methodologies-Patterns-Frameworks- The Unified Approach.
Unified modeling language: Introduction-Static and Dynamic Models-Why Modeling-Introduction to the unified modeling language-UML Diagrams-UML Class Diagram-Use-Case Diagram-UML Dynamic Modeling-Model management: Packages and Model organization-UML Extensibility-UML Meta–Model.

UNIT-III:

Object-oriented Analysis Processes: Identifying Use-Cases: Introduction-Why Analysis is Difficult Activity-Business Object Analysis-Use Case Driven Object-Oriented Analysis-Business Process Modeling-Use-Case Model-Developing Effective Documentation. **Object Analysis:** Introduction-Classifications Theory-Approaches for identifying classes-Noun Phrase Approach. **Identifying Object Relationships- Attributes- and Methods:** Introduction-Associations-Super-Sub Class Relationships-A-Part-of Relationships-Aggregation-Identifying Attributes and Methods-Defining Attributes by Analyzing Use Cases and Other UML Diagrams – Object responsibility: methods and messages.

UNIT-IV:

Object oriented Design Process and Design –Axioms: Introduction-Object-Oriented Design process - Object-oriented Design Axioms - Corollaries - Design Patterns. **Designing Classes: I**ntroduction-The Object-oriented Design Philosophy-UML Object Constraint Language-Designing Classes: The Process - Class Visibility - Designing Classes: Refining Attributes.

UNIT-V:		
Software Quality Assurance: Introduction-Quality Assurance Tests-Testing Strategies-Impact of Object orientation on Testing-test cases-Test Plan-Continuous Testing-Myer's Debugging principles.		
Outcomes:		
1. To develop knowledge on various object-oriented methodologies. 2. To Understand UML Modeling. 3. To learn various analysis techniques. 4. To apply the concepts of architectural design using corollaries and axioms. 5. To familiarize with Testing Strategies.		
Text Book:		
Object-Oriented Systems Development- Ali Bahrami McGrawHill- 1999.		
Reference Books:		
1. Craig Larman: Applying UML and Patterns- Pearson Education- 2002. 2. Grady Booch: Object-oriented analysis and design- Addison – Wesley- 1994. 3. D Jeya Mala-S Geetha- Object Oriented Analysis and Design Using UML –TMG- May 2013.		

MSCS 2.1.2

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester III

Network Security

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To learn various cryptographic algorithms including secret key cryptography, hashes and message digests, public key algorithms.
2. To Familiar in design issues and working principles of various authentication protocols and various secure communication standards including Kerberos.
3. To acquire the knowledge on various hash functions.
4. To understand the key management and distribution process.
5. To gain knowledge on PGP and SMIME.

SYLLABUS

UNIT-I:

Computer and Network Security Concepts: Computer Security Concepts, Security Attacks, Services and Mechanisms, A Model of Network Security.

Symmetric Ciphers: Symmetric The Data Encryption Standard, The Strength of DES. Multiple Encryption and Triple Des, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode, Advanced Encryption Standard.

UNIT-II:

Asymmetric Ciphers: Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie–Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography.

UNIT-III:

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm (SHA-512).

Digital Signatures: Elgamal Digital Signature Scheme, Schnorr Digital Signature, NIST Digital Signature Algorithm.

UNIT-IV:

Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates.

User Authentication: User Authentication, Remote User-Authentication Principle, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption .

UNIT-V:

Network and Internet Security Electronic Mail Security: Transport-Layer Security, Internet Mail Architecture, Email Formats, S/MIME. Pretty Good Privacy IP Security: IP Security Policy, Encapsulating Security Payload, Combining Security Associations Internet Key Exchange

Outcomes:

1. To learn the Basic Principles, different security threats, countermeasures, foundation course of Symmetric Encryption.
2.To familiarizes with the principles of Asymmetric key algorithms and operations of asymmetric key cryptography.
3. To Understand with the design concepts of Cryptographic Hash Functions as SHA-512 and Digital Signatures as Elgamal.
4. To acquire the concept of Revise Key Management and Distribution and User Authentication.
5.To Determine the knowledge of Network and Internet Security Protocols such as S/MIME, PGP, TLS and IP Security.

Text Book:		
1. Cryptography and Network Security Principals and Practice, William Stallings, 7th Edition, Pearson, 2017 .		
Reference Books:		
1.Cryptography and Network Security, 3rd Edition Behrouz A Forouzan, Deb deep Mukhopadhyay, McGraw Hill,2015. 2. Network Security: Private Communication in a Public World, Kaufman, Pearson Education Asia, New Delhi, 2002.		

MSCS 2.1.3

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester III

DATA WAREHOUSING AND DATA MINING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. To understand the evolution of data warehousing and data mining systems
2. To understand extracting, cleaning and transformation of data into a warehouse.
3. To learn the principles of statistics, information theory, machine learning and other areas AI and implementation of data mining techniques.
4. To understand pattern mining using classification and clustering methods.
5. To learn concepts of Mining Complex Types of Data.

SYLLABUS

UNIT-I:

Introduction to Data Mining: Introduction-What is Data Mining? -Relational Databases-Data Warehouses-Transactional Databases- Advanced Database Systems and Advanced Database Applications-Data Mining Functionalities-Classification of data mining systems-Data Mining task primitives-integration of data mining system with a database or Data Warehouse System-Major issues in Data Mining

UNIT-II:

Data Preprocessing: Why Pre-process the Data? Data Cleaning-Data Integration and Transformation-Data Reduction-Discretization and Concept Hierarchy Generation. Data Warehouse and OLAP Technology for Data Mining: What is Data Warehouse? -Multi-Dimensional Data Model-Data Warehouse Architecture-Data Warehouse Implementation-From Data Warehousing to Data Mining.

UNIT-III:

Mining Frequent Patterns- Associations and Correlations: Basic concepts and Road Map-Efficient and scalable frequent item set methods-Mining various kinds of association rules-Mining multi-level association rules from transactional data bases-Mining multi-dimensional association rules from relational databases and data warehouses-From Association Mining to Correlation Analysis-Constraint Based Association Rule Mining.

UNIT-IV:

Classification and Prediction: Concepts and Issues regarding Classification and Prediction-Classification by Decision Tree Induction-Bayesian Classification and Back Propagation-Prediction Cluster Analysis: What is Cluster Analysis: What is Cluster Analysis-A Categorization of Major Clustering Methods-Partitioning Methods: K-Means and K-Medoids-Hierarchical Methods: Agglomerative and Devisive Hierarchical Clustering-Outlier Analysis

UNIT-V:

Mining Complex Data: Graphs Mining: Approaches to Graph Mining-**Text Mining**: Text Classification-Vector Space Model-**Web Mining**: Crawling & Indexing -Hyperlink Analysis -Page Rank algorithm -Web Search and Information Retrieval -**Case Study**: Query Recommender System.

Outcomes:		
1.To understand the differences between OLTP and OLAP. 2. To learn data cube technology, summarization and querying high dimensional data. 3. To familiarize the concepts of similarity, distance, information gain, performance and error metrics used for evaluation of mining results. 4. To acquire knowledge in various approaches of association rule mining, supervised and unsupervised learning. 5.To practice the concepts of mining complex types of data which are useful for the dynamic data analysis.		
Text Book:		
Data Mining Concepts and Techniques- Jiawei Han and Micheline Kambler- Third edition- Morgan Kaufman Publications.		
Reference Books:		
1. Introduction to Data Mining- Adriaan - Addison Wesley Publication 2. Data Mining Techniques- A.K.Pujari- University Presss.		

MSCS 2.1.4

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc (CS)-Semester III

PYTHON PROGRAMMING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. Teach an example of scripting and interpretative language and compare it with classical compiled programming languages.
2. Introduce the student to Python programming fundamentals.
3. Expose students to application development and prototyping using Python.
4. Learn to apply fundamental problem-solving techniques.

SYLLABUS

UNIT-I:

Introduction: History of Python, Need of Python Programming, Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation. **Types, Operators and Expressions**: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass.

UNIT-II:

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions. **Functions**: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. **Modules**: Creating modules, import statement, from statement. Name-spacing. **Python packages**: Introduction to PIP, Installing Packages via PIP, Using Python Packages.

UNIT-III:

Object Oriented Programming OOP in Python: Classes, self-variable, Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding. **Error and Exceptions**: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

UNIT-IV:

Data base interaction: what is DB interaction, types of database's supported by python, Methods, how to insert the data in to database. **Multithreading in Python**: Thread Control Block (TCB): Thread Identifier, Stack pointer, Program counter, Thread state, Thread's register set, Parent process Pointer–Multithreading.

UNIT-V:

Python file operations: file basic operations –open, write, appending, read, readline, readlines. **Python Standard Library**: Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, GUI Programming.

Outcomes:		
1. To familiarize with the basics of Python language. 2. To gains knowledge on Python data structures, functions, modules and packages. 3. To understand object-oriented programming and exception handling. 4. To learn multithreading implementation and database connectivity in python. 5. To develop knowledge on Python file operations.		
Text Books:		
1. Python Programming: A Modern Approach, VamsiKurama, Pearson 2. Learning Python, Mark Lutz, Orielly		
Reference Books:		
1. Think Python, Allen Downey, Green Tea Press 2. Core Python Programming, W. Chun, Pearson. 3. Introduction to Python, Kenneth A. Lambert, Cengage 4. NPTEL Videos.		

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc(CS)-Semester III
(Elective – II)

DATA SCIENCE

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1.Learn to use and program in the programming language R
2.Understands the concepts of developing Lists and Data Frames
3.Understands the modeling aspects and business intelligence life cycle and techniques used in it.
4.To implement line properties, use different setter methods and practice different kinds of plots.

SYLLABUS

UNIT-I:

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices

UNIT-II:

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, **DATA FRAMES**: Creating Data Frames, Accessing Data Frames, Other Matrix- Like Operations

UNIT-III:

Business Intelligence: Effective and timely decisions – Data, information and knowledge – Role of mathematical models – **Business intelligence architectures**: Cycle of a business intelligence analysis –Development of a business intelligence system – Ethics and business intelligence. **Knowledge Delivery**: The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications

UNIT-IV:

Data Visualization-I: Making Sense of Data through Advanced Visualization: Controlling the line properties of a chart, Using keyword arguments, Using the setter methods, Using the setp() command, Creating multiple plots

UNIT-V:		
Data Visualization-II: Playing with text, Styling plots, Box plots, Heatmaps, Scatter plots with histograms, A scatter plot matrix, Area plots, Bubble charts, Hexagon bin plots, Trellis plots, 3D plot of a surface. Plotting and Visualization: A brief matplotlib API primer, plotting functions in pandas, Plotting Maps, Python Visualization Tool Ecosystem.		
Outcomes:		
1.Understand the basics in R programming in terms of constructs, control statements, string functions 2.Understand the use of R for Big Data analytics. 3.Identify the major frameworks of computerized decision support: decision support systems (DSS), data analytics and business intelligence (BI). 4. Design and create data visualizations and lists the different types of plots.		
Text Book:		
1. R Programming for Data Science by Roger D. Peng 2. Mastering Python for Data Science by Samir Madhavan, PACKT Publishing, 2015. 3. "Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"		
Reference Books:		
1.The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage Learning India. 2. Big Data Black Book by Dt Editorial Services, Dreamtech Publications, 2016.		

MSCS 2.1.5

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc(CS)-Semester III
(Elective – II)

CLOUD COMPUTING

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1. The objective of this course is to gain the in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications.
2. To introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.
3. To expose the students to frontier areas of Cloud Computing.

SYLLABUS

UNIT-I:

Introduction to Cloud Computing: Evolution and History of Cloud Computing, Introduction to Cloud Computing, Why Cloud Computing is Becoming Highly Important. **Migrating into a Cloud**: Introduction-Broad Approaches to Migrating into the Cloud-The Seven-Step Model of Migration into a Cloud- **Deployment Models:** Public, Private, Hybrid Cloud Models**, Service Models: Software as a Service (SaaS**): Software as a Service, Evolution of SaaS- **Platform as a Service (PaaS):** Introduction to PaaS, Evolution of PaaS, PaaS Service Providers- Amazon AWS, Amazon Elastic Beanstalk- **Infrastructure as a Service (IaaS):** Evolution, IaaS Architecture- Advantages and Disadvantages of Infrastructure as a Service

UNIT-II:

The Enterprise Cloud Computing Paradigm: Introduction-Issues for Enterprise Applications on the Cloud-Transition Challenges-Enterprise Cloud Technology and Market Evolution-**Virtualization:** enabling technologies, types of virtualizations, server virtualization, desktop virtualization, memory virtualization, application and storage virtualization tools and products available for virtualization

UNIT-III:

Cloud Programming and Software Environments Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT-IV:

An Architecture for Federated Cloud Computing: Introduction- A Typical Use Case-The Basic Principles of Cloud Computing- A Model for Federated Cloud Computing. **SLA Management in Cloud Computing A Service Provider's Perspective:** Traditional Approaches to SLO Management- Types of SLA- Life Cycle of SLA- SLA Management in Cloud.

UNIT-V:		
Best Practices in Architecting Cloud Applications in the AWS Cloud: Introduction-Cloud Concepts. **Storage Systems** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Amazon Elastic Compute Cloud (Amazon EC2)- Amazon Simple DB , Amazon Simple Storage Service (Amazon S3).		
Outcomes:		
1. To understand the concepts of cloud computing platforms and their migration issues. 2. To learns the techniques of Virtual Machines Provisioning and Scheduling. 3. To gain knowledge on Integration of Private and Public Clouds. 4. To familiarize with Federated Cloud Computing Architecture. 5. To develop the knowledge of Architecting Cloud Applications in the AWS and Cloud Mashups.		
Text Book:		
• Cloud Computing:A Practical Approach,Anthony T. Velte , Toby J. Velte, Ph.D.,Robert Elsenpeter • "Cloud Computing: Principles and Paradigms" Rajkumar Buyya James Broberg Andrzej Goscinski - Pearson education..		

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc(CS)-Semester III
(Elective – II)

INTERNET OF THINGS

Credits: 4	Theory: 4 Hours	Tutorials: -
Max Marks: 100	External: 60 Marks	Internal: 40 Marks

Course Objectives:

1.Understand the basic concepts of IoT Sensors and Actuators.
2. Understand the basics of IoT Networking.
3. Understand the connectivity technologies of IoT.
4. Understand concepts of designing IoT Application with Arduino Programming
5.Apply concepts of IoT in real time problems and discussion of IoT Case Studies.

SYLLABUS

UNIT-I:

Introduction to IoT: Origin of Terminology-Machine to Machine (M2M)-Characteristics-IoT Market Share -Evaluation of Connected Devices -IoT Enablers- Connectivity Layers - Baseline Technologies -IoT vs. M2M -IoT vs. WoT-Terminological Interdependence -IoT Resulting in Address Crunch - Connectivity Terminologies - IoT Network Configurations - Gateway Prefix Allotment - Impact of Mobility on Addressing - Gateways - Multi- homing - IPv4 -IPv6. **Sensing**: Definition-Sensors-Transducers-Sensor vs. Transducer-Sensor Features-Sensor Resolution-Sensor Classes-Analog Sensors-Digital Sensors-Scalar Sensors-Vector Sensors-Sensor Types-Sensorial Deviations-Non-linearity. **Actuation**: Actuator-Actuator Types-Hydraulic Actuators-Pneumatic Actuators-Electric Actuators-Thermal or Magnetic Actuators-Mechanical Actuators-Soft Actuators.

UNIT-II:

Basics of IoT Networking: Convergence of Domains-IoT Components-Functional Components of IoT-IoT Interdependencies-IoT Service Oriented Architecture-IoT Categories-IoT Gateways-IoT and Associated Technologies-Technical Deviations from Regular Web-Key Technologies for IoT-IoT Challenges-Considerations-Complexity of Networks-Wireless Networks-Scalability-Functionality-based IoT Protocol Organization-MQTT-Introduction-MQTT Methods-Communication-MQTT Topics-Applications-SMQTT-CoAP-Introduction-CoAP Position-CoAP Message Types-CoAP Request-Response Model-Features.

UNIT-III:

Connectivity Technologies: Communication Protocols - IEEE 802.15.4 -Features of IEEE 802.15.4-IEEE 802.15.4 Variants-IEEE 802.15.4 Types-IEEE 802.15.4 Frames-Beacon Enabled Networks-Non-Beacon Enabled Networks-Zigbee-Features of ZigBee-Important Components-ZigBee Topologies-ZigBee Mesh-ZigBee Types-ZigBee Network Layer-Applications. 6LoWPAN-Introduction-Features of 6LoWPANs-Addressing in 6LoWPAN-6LowPAN Packet Format-Header Type. RFID-Introduction-RFID Features-Working Principle–Applications - Sensor Networks- Machine-to-Machine Communications.

UNIT-IV:		
Interoperability in IoT, Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino- Introduction to Raspberry Pi- Implementation of IoT with Raspberry Pi- Introduction to SDN - SDN for IoT- Data Handling and Analytics- Cloud Computing- Cloud Computing Sensor- Cloud- Fog Computing- Smart Cities and Smart Homes.		
UNIT-V:		
Connected Vehicles- Smart Grid- Industrial IoT: Case Study- Agriculture, Healthcare, Activity Monitoring- **IoT Applications:** i) Lighting as a service (case study)- ii) Intelligent Traffic systems (case study)- iii) Smart Parking (case study)- iv) Smart water management (case study)-IOT for smart cities (Case study Smart city Barcelona) **Challenges in IOT implementation:** i) Big Data Management-ii) Connectivity challenges.		
Outcomes:		
1. To gain conceptual understanding of sensors and actuators. 2. To familiarize the key technologies, challenges and protocols of IoT. 3. To acquire knowledge on connectivity technologies, applications of Network Layer. 4. To attain knowledge on IoT Applications with Arduino and Raspberri Pi.		
Text Books:		
1.Internet of Things: A Hands-on Approach by Arsheep Bahga. 2.IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things by Hanes David		
Reference Books:		
1.Arduino Projects for Engineers by Neerparaj Rai. 2.Designing the Internet of Things by Adrian Mcewen, Hakin Cassimally		

MSCS 2.1.6

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc(CS)-Semester III

Open Elective II

MSCS 2.1.7

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)

M.Sc(CS)-Semester III

PYTHON PROGRAMMING LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	**External: 50 Marks**	**Internal: 50 Marks**

Course Objectives:

1. Interpret the use of procedural statements like assignments, conditional statements, loops and function calls.
2. Infer the supported data structures like lists, dictionaries and tuples in Python.
3. Illustrate the application of matrices and regular expressions in building the Python programs.
4. Discover the use of external modules in creating excel files and navigating the file systems.
5. Describe the need for Object-oriented programming concepts in Python.

SYLLABUS

Sl. No.	Programs
1.	a) Write a Python program to print all the Disarium numbers between 1 and 100. b) Write a Python program to encrypt the text using Caesar Cipher technique. Display the encrypted text. Prompt the user for input and the shift pattern.
2.	Devise a Python program to implement the Rock-Paper-Scissor game.
3.	Write a Python program to perform Jump Search for a given key and report success or failure. Prompt the user to enter the key and a list of numbers.
4.	The celebrity problem is the problem of finding the celebrity among n people. A celebrity is someone who does not know anyone (including themselves) but is known by everyone. Write a Python program to solve the celebrity problem.
5.	Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
6.	Perform the following file operations using Python a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories. b) Read a file content and copy only the contents at odd lines into a new file.

Sl. No.	Programs
7.	Create a menu drive Python program with a dictionary for words and their meanings. Write functions to add a new entry (word: meaning), search for a particular word and retrieve meaning, given meaning find words with the same meaning, remove an entry, display all words sorted alphabetically.
8.	Using Regular Expressions, develop a Python program to a) Identify a word with a sequence of one upper case letter followed by lower case letters. b) Find all the patterns of "1(0+)1" in a given string. c) Match a word containing 'z' followed by one or more o's. Prompt the user for input.
9.	Write a Python program to plot the Line chart in MS Excel Sheet using XlsxWriter module to display the annual net income of the companies mentioned below. MS Excel Data
10.	Devise a Python program to implement the Hangman Game.

Outcomes:

1. To learn the concepts of syntax of python programs.
2. To infer the core data structures like lists, dictionaries, tuples and sets in Python, to store, process and sort the data.
3. To interpret the concepts of Object-oriented programming in Python using encapsulation, polymorphism and inheritance.
4. To familiarize with Python regular expression for data verification and utilize matrices for building efficient Python programs.
5. To identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.

MSCS 2.1.8

Gayatri Vidya Parishad College for Degree and PG Courses (AUTONOMOUS)
M.Sc(CS)-Semester III

OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Credits: 1.5	Lab: 3 Hours	Tutorials: -
Max Marks: 100	External: 50 Marks	Internal: 50 Marks

Course Objectives:

- To capture the requirements specification for an intended software system
- To draw the UML diagrams for the given specification
- To map the design properly to code
- To test the software system thoroughly for all scenarios
- To improve the design by applying appropriate design patterns.

SYLLABUS

Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.

Programs

Week 1: Introduction to Visual Paradigm tool

Week 2:

- Identify a software system that needs to be developed.
- Document the Software Requirements Specification (SRS) for the identified system.

Week 3 and Week 4: Identify use cases and develop the Use Case model. (Class 3 &4)

Week 5 and Week 6: Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram and object diagrams from that.

Week 7 and Week 8: Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams

Week 9: Draw relevant State Chart and Activity Diagrams for the same system.

Week 10 and Week 11: Test the software system for all the scenarios identified as per the use case diagram.

Week 12: Mini Project (as per topics covered).

Outcomes:

1. Ability to analyze software specifications
2. Acquire knowledge to Design UML diagrams using Visual Paradigm
3. Familiarizes with quality assurance procedures

Text Books:

1. Craig Larman: Applying UML and Patterns- Pearson Education- 2002.

Reference Books:

1. Object-Oriented Systems Development- Ali Bahrami McGrawHill- 1999.
2. D Jeya Mala-S Geetha- Object Oriented Analysis and Design Using UML –TMG- May 2013.

MASTER OF SCIENCE IN COMPUTER SCIENCE

Syllabi

With effect from 2023-24 admitted batch

II YEAR II SEMESTER

IV Semester

Subject code	Title of the Paper	Periods / Week		Max Marks		Total	Credits
		Theory	Lab	Ext.	Int.		
MSCS2.2.1	Seminar	-	-	-	50	50	2
MSCS2.2.2	Project	-	-	50	50	100	12
Total		**-**	**-**	**50**	**100**	**150**	**14**

GUIDELINES FOR PREPARING THE REPORT OF THE PROJECT WORK
FORMAT FOR PREPARATION OF PROJECT REPORT FOR M.Sc(CS)

1.LIST OF CONTENTS:

a. Abstract
b. Introduction
c. Literature survey
    a. Introduction
    b. Current system
    c. Problem statement
    d. Proposed system
    e. Objectives
    f. Functional and Non-Functional Requirements

UML Modeling

Design and description of algorithms (Examples included)

Coding

Testing

Results and Conclusions

References

a. Research references
b. Book references

Appendix

a. List of tables
b. List of figures
c. Glossary

2. PAGE DIMENSIONS AND BINDING SPECIFICATIONS:

The dimension of the project report should be on A4 size with margin specifications 1.5inch space for all sides like top, bottom and left, Right. The project report should be bound using flexible cover of the thick white art paper. The cover should be **printed in black letters** and the text for printing should be identical.

3. PREPARATION FORMAT:

3.1 Cover Page & Title Page – A specimen copy of the Cover page & Title page of the project report is given in **Appendix 1.**

3.2 Bonafide Certificate: The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 12, as per the format in **Appendix 2.**

The **certificate** shall carry the supervisor's signature and shall be followed by the supervisor's

Name, academic designation (not any other responsibilities of administrative nature), Department and full address of the institution where the supervisor has guided the student. The term **'SUPERVISOR'** must be typed in capital letters between the supervisor's names And academic designation.

3.3 Abstract – Abstract should be one-page synopsis of the project report typed double line Spacing, Font Style 'Times New Roman' and Font Size '12'.

3.4 Table of Contents – The table of contents should list all material following it as well as any Material which precedes it. The title page and Bonafide Certificate will not find a place Among the items listed in the Table of Contents but the page numbers of which are in lower Case Roman letters. 1.5" spacing should be adopted for typing the matter under this Head.

3.5 List of Tables – The list should use exactly the same captions as they appear above the Tables in the text. One and a half spacing should be adopted for typing the matter under this head.

3.6 List of Figures – The list should use exactly the same captions as they appear below the Figures in the text. One and a half spacing should be adopted for typing the matter under this head.

3.7 List of Symbols, Abbreviations and Nomenclature – One and a half spacing should be Adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be Used.

3.8 Chapters – The chapters may be broadly divided into 3 parts (i) Introductory chapter, (ii) Chapters developing the main theme of the project work (iii) and Conclusion.

The main text will be divided into several chapters and each chapter may be further divided Into several divisions and sub-divisions.

- Each chapter should be given an appropriate title, Font Style Times New Roman and Font Size 14 with bold.
- Tables and figures in a chapter should be placed in the immediate vicinity of the Reference where they are cited.
- Footnotes should be used sparingly. They should be typed single space and placed Directly underneath in the very same page, which refers to the material they annotate.

a. **Appendices:**

- Appendices are supplemental to a thesis in nature and, when included, appear after the references/bibliography.
- Appendices should be numbered using Arabic numerals., Appendix 1, Appendix 2, etc.
- Appendices, Tables and References appearing in appendices should be numbered and referred to as appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be made in

The contents page also.

3.10 List of References:

The listing of references should be typed 4 spaces below the heading "REFERENCES" in alphabetical order in single spacing left – justified. The reference material should be listed in the alphabetical order of the first author. The name of the author/authors should be immediately followed by the year and other details. A typical illustrative list given below relates to the citation example quoted above.

REFERENCES:

1. Ariponnammal, S. and Natarajan, S. (1994) 'Transport Phonomena of SmSel – X Asx', Pramana – Journal of Physics Vol.42, No.1, pp.421-425.

2. Barnard, R.W. and Kellogg, C. (1980) 'Applications of Convolution Operators to Problems in Univalent Function Theory', Michigan Mach, J., Vol.27, pp.81–94.

3. Shin, K.G. and Mckay, N.D. (1984) 'Open Loop Minimum Time Control of Mechanical Manipulations and its Applications', Proc.Amer.Contr.Conf., San Diego, CA, pp. 1231-1236.

Tables and Figures:

All numerical data in the body of the project report should be designed in a tabular form. All other non-verbal materials used in the body of the project work and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

TYPING INSTRUCTIONS:

1. The impression on the typed copies should be black in color.
2. 1.5" spacing should be used for typing the general text.
3. The general text shall be typed in the Font style 'Times New Roman' with Font size is 12
4. All side headings shall be typed in the Font style 'Times New Roman' and Font Size is 12 with Bold.

* * * * *

GAYATRI VIDYA PARISHAD
COLLEGE FOR DEGREE and P.G COURSES (Autonomous)
(Affiliated to Andhra University)
VISAKHAPATNAM

Department of Computer Science

Certificate

This is to certify that the project report titled **"----------"** is the bona fide record of project work carried out by **Mr/Mrs/Miss. XXXXXXX (Regd. No. ----------),** a student of this college, during the academic year **2020-21**, in partial fulfillment of the requirements for the award of the degree of Master of science in Computer Science.

Project Guide
Name
Designation

Head of the Department
Name
Designation

External Examiner

DECLARATION

I, **Mr/Mrs/Miss. XXXXXXX** hereby declare that the project report titled "----------" is an original work done at **Gayatri Vidya Parishad College for Degree and P.G Courses(A), Visakhapatnam,** submitted in partial fulfillment of the requirements for the award of Master of Science in Computer Science, to Gayatri Vidya Parishad College for Degree And P.G Courses(A), affiliated to Andhra University. I assure that this project is not submitted by me in any other University or college.

(Mr/Mrs/Miss. XXXXXXX)

ACKNOWLEDGEMENT

I consider it as a privilege to thank all those people who helped me a lot for successful completion of the project "----------".

First of all, I would like to thank Dr/Prof----------, Principal of **Gayatri Vidya Parishad College for Degree and P.G Courses(A),** who has provided full- fledged lab and infrastructure for successful completion of my project work.

I would like to thank Dr/Prof ----------, Director of Department of Computer Science & Applications, **Gayatri Vidya Parishad College for Degree and P.G Courses(A)**, who has given me a lot of support and encouragement during my project work.

I would like to thank our ever-accommodating Head of the Department of Computer Science Dr/Prof----------, and my guide Dr/Prof-------- has obliged in responding to every request though they are busy with their hectic schedule of administration and teaching.

I thank all the **Teaching & Non-Teaching staff** who has been a constant source of support and encouragement during the study tenure.

(Mr/Mrs/Miss. XXXXXXX)

CERTIFICATE FOR STUDENTS WHO HAD DONE PROJECT IN THE INDUSTRY /ORGANISATION

CERTIFICATE FROM INDUSTRY

This is to certify that it is a bonafide record of the Dissertation work entitled "_____" done by <STUDENT NAME> , a student of M.Sc(CS) in the Department of Computer Science, Gayatri Vidya Parishad College for Degree and P.G Courses(A) during the period 200 - 200 in partial fulfillment of the requirements for the Award of Degree of Master of Science in Computer Science. This work is not submitted to any University for the award of any Degree / Diploma. This work is carried out in Gayatri Vidya Parishad Degree and P.G College(A), Rushikonda, Visakhapatnam-530045.

INTERNAL GUIDE **HEAD OF THE DEPARTMENT**