

Sri Sathya Sai College for Women, Bhopal

(An Autonomous College affiliated to Barkatullah University, Bhopal)

(NAAC Accredited 'A' Grade)



SYLLABUS

PG

SESSION- 2023-24

Class: M.Sc. Semester-I & II

SUBJECT: Computer Science

Sri Sathya Sai College for Women, Bhopal

(An Autonomous Affiliated to Barkatullah University Bhopal)

Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session-2023-24)

M. Sc. Semester I Computer Science (for Regular Students only)

Scheme of Marks

Paper Code	Paper Title	CCE		Theory /Practical		Internal	Theory /Practical	Grand Total
		Min	Max	Min	Max			
	Discrete Mathematics Structures	5	15	31	85	15	85	100
	Programming skills with C++	5	15	31	85	15	85	100
	Computer Organization & Architecture	5	15	31	85	15	85	100
	Office Tools	5	15	31	85	15	85	100
	Lab-I (Programming with C++)	-	-	18	50	-	50	50
	Lab-II (Office tools)	-	-	18	50	-	50	50
							Grand Total	500

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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

Class	:	M.Sc. Semester I
Subject	:	Computer Science
Paper	:	I
Paper Title	:	Discrete Mathematics Structures
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives-

- Simplify and evaluate basic logic statements, prepositions, set operations, Boolean algebra and Algebraic Structures.
- Develop an understanding of relations, functions and graphs and their applications.
- Develop an understanding of modeling problems mathematically in computer science using discrete structures.

Unit I

Mathematical Logic: Statements and notations, Connectives: Negation, Conjunction, Disjunction. Statement formulas and truth tables, Conditional and Biconditional, Well formed formulas. Tautologies, Equivalence of formulas, duality law, Tautological implications, contradiction contingency, Algebra of propositions, the predicate calculus: predicates, the statement function, Variables and Quantifiers, predicate formulas, free and bound variables, the universe of discourse.

Unit II

Set Theory: Basic concepts of set theory, notation, inclusion and equality of sets, the power set, types of sets, operations on set, Venn diagrams, some basic set identities, the principle of specification, ordered pairs, Cartesian products, relations & ordering.

Unit III

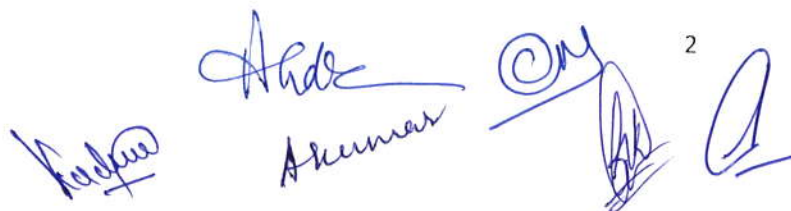
Algebraic Structures: Introduction, algebraic system: examples and its general properties, semigroups and monoids: definitions and examples, homomorphism of semi groups and monoids, grammars and languages, Polish expressions and their compilations: polish notations, conversion of infix expressions to polish notation.

Unit IV

Lattices and Boolean Algebra: Lattices and algebraic systems, principle of duality, basic properties of algebraic systems defined by lattices, distributive and complemented lattices, Boolean lattices and Boolean algebra, identity of Boolean algebraic Boolean functions and Boolean expressions, normal forms, simplification of logic expressions using Karnaugh map, switching circuits.

Unit V

Graph Theory: Introduction, basic terminology, multi-graphs and weighted graphs, digraphs and relations, representation of graphs: incidence matrix, adjacency matrix, operations on graphs, path and circuits, Graph traversal: Depth first search, breadth first search, shortest paths in weighted graphs.

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Learning Outcomes-

After studying this subject student would be able to:

- Identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, binary relations, and graphs.
- Produce convincing arguments, conceive and/or analyze basic mathematical proofs and discriminate between valid and unreliable arguments.
- Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems and make effective use of appropriate technology.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. J. P. Tremblay , “Discrete Mathematics structures with application to computer science”
2. D.C. Agarwal, “Discrete Mathematics”

Reference Books :

1. C.L. Liu , “Element of discrete mathematics”
2. J.K Sharma , “Discrete Mathematical”, Macmillan publication

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session-2023-24)

Class	:	M.Sc. Semester I		
Subject	:	Computer Science		
Paper	:	II		
Paper Title	:	Programming skills with C ++		
Compulsory/Optional	:	Compulsory		
Max. Marks	:	Theory - 85	CCE - 15	Total - 100

Course Objectives-

- To learn the characteristics of object-oriented programming: data abstraction and information hiding, inheritance, and dynamic binding of messages to methods.
- To write programs with advanced features of the C++ programming language.
- Be able to apply object oriented techniques to solve bigger computing problems.
- To develop good programming practices, so that students can opt for various fields like software engineers, system analysts, program managers and user support personnel.

Unit I

OOPS: Introduction to oops principles, procedure oriented programming vs. object oriented programming, advantages of OOPs, applications, examples of object oriented languages. Introduction to C++ : tokens, expressions, keywords, identifiers, basic data types, user defined data types, derived data types, symbolic constants, type compatibility, variable declaration, dynamic initialization of variables, reference variables. Operators in C++: scope resolution operator, memory management operators, manipulators, type cast operators, operator precedence .Control structures

Arrays: single, multidimensional, array of strings. Functions: function prototyping, function call, scope rules of functions, call by value, call by reference, calling functions with arrays.

Unit II

Classes and Objects : specifying a class, defining member function, private member functions, scope resolution operator, memory allocation for objects, static data members, static member functions, arrays of objects, objects as function arguments, returning objects, Inline functions, friend functions.

Pointers: pointer variables, operators and expressions, initializing pointers, array of pointers, this pointer, C++ dynamic memory allocation operator.

Constructors: definition, types: default, copy, parameterized, multiple, constructors with default arguments, Destructors.

Unit III

Overloading: definition, rules of overloading, function overloading, Operator overloading and its restrictions, overloading unary and binary operators, operator overloading using a friend function.



Unit IV

Inheritance: derived class and base class, defining derived classes, types of inheritance-single, multiple, multilevel, hierarchical, hybrid inheritance. Making a private member inheritable, passing parameter to the base class, constructors and destructors in derived classes, nesting of classes. Virtual Base class, abstract classes.

Template, Template Classes, Explicit Class, Exception handling, Exception Handling Fundamentals, The try Block, the catch Exception Handler, The throw Statements.

Unit V

Managing console I/O operations: C++ streams, stream classes, unformatted and formatted I/O operations, managing output with manipulators. Working with files: classes for file stream operations, opening and closing files, detecting end of file, sequential I/O operations, command line argument.

Learning Outcomes –

After studying this subject student would be able to:

- Develop a thorough understanding of object-oriented programming by designing programs using OOP techniques
- Develop a good documentation style in all of the programs written in this course.
- Develop a thorough understanding of stream input/output for both console and files.
- Develop the ability to analyze problems and propose algorithms to solve them.
- Develop a menu-driven solution for a real world problem, capable of taking input from user, storing them permanently and open in the format required by the user applying exception handling wherever necessary.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. Herbert Schildt , “C++ The complete reference”, TMH
2. E.Balaguruswamy, “Object Oriented Programming in C++”.

Reference Books:

1. E.Robert Lafore , “Programming in C++”.
2. John Hubbard , “Outline of Programming with C++” (Schaum Series)
3. M Kumar , “Programming in C++ made simple”.

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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

Class	:	M.Sc. Semester I
Subject	:	Computer Science
Paper	:	III
Paper Title	:	Computer Organization & Architecture
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives-

- To learn about the machine level representation of data, instruction sets, computer arithmetic.
- To familiarize students with CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic.
- To make students analyze fundamental issues in architecture design and their impact on performance.

Unit I

Data Representation: Data Types (Number System - Octal and Hexadecimal Number, Decimal Representation, and Alphanumeric Representation), Complements, Fixed Point and Floating-Point Representation.

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combination Circuits: Adder, subtractor, multiplexor, Demultiplexor etc. Flip-Flops: SR Flip-flops, D Flip-Flops, JK Flip-Flops, T Flip-Flops, Edge Triggered Flip-Flops, master-slave, Execution Table, Sequential Circuits.

Unit II

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Micro operations: Arithmetic, Logical, Shift Micro- operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instruction, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer.

Unit III

Programming the Basic Computer: Machine language, Assembly language, The Assembler, Program Loops, programming arithmetic and logic operations, input-output programming, character manipulation, program interrupt.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC and CISC Characteristics.

Unit IV

Memory Organization: Introduction, memory hierarchy, main memory, auxiliary memory, Associative memory, cache memory, locality of reference, hit/miss ratio, various mapping process: Associative mapping, direct mapping, and Set-Associative mapping, memory management hardware.

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Unit V

Input-Output Organization: Peripheral Devices -ASCII alphanumeric Characters, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Access (DMA), Input-Output Processor (IOP), Serial Communication.

Introduction to parallel processing, pipelining. Introduction to multiprocessors.

Learning Outcomes -

After studying this subject student would be able to:

- Understand the basics of computer hardware and how software interacts with computer hardware, understand how computers represent and manipulate data
- Assemble a simple computer with hardware design including data format, instruction format, instruction set, addressing modes, bus structure, input/output, memory, arithmetic/logic unit, control unit, and data, instruction and address flow
- Use Boolean algebra as related to designing computer logic, through simple combinational and sequential logic circuits
- Analyze and evaluate computer performance

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. M.Morris Mano , “Computer System Architecture”, PHI.
2. Heuring Jordan , “Computer System Design & Architecture” (A.W.L.)

Reference books:

1. William Stalling, “Computer Organization & Architecture”, Pearson Education Asia.
2. V. Carl Hamacher , “Computer Organization”, TMH
3. Tannenbaum, “Structured Computer Organization”, PHI .

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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

Class	:	M.Sc. Semester I		
Subject	:	Computer Science		
Paper	:	IV		
Paper Title	:	Office Tools		
Compulsory/Optional	:	Compulsory		
Max. Marks	:	Theory - 85	CCE - 15	Total - 100

Course Objectives:

- To learn use of basic features of windows operating systems and to write and organize documents, apply various formatting and graphic features to enhance documents.
- To use spreadsheet for organizing data, calculation, graphing tools, pivot tables.
- To apply functions on data in spreadsheet.
- To learn creation of slide-based presentations, use of templates, color scheme, slide transition and animation.

Unit I

Introduction to Windows: Features of Windows. Difference between CUI & GUI Interfaces, Hardware Requirement for Running Version of Windows. New Installation & Upgradation, Managing Hardware & Software - Installation of Hardware & Software, Desktop, Start Button, Start Menu, Wall Paper, Use of Recycle Bin, Computer, Network Icon, Using Scanner Web Camera, Printers, Searching files and programs, Multiple User Feature of Windows, Creating and Deleting User, Changing User Password, etc. Creating folder and shortcuts of application on desktop, Using Windows Explorer, Accessories, Control Panel: Display, Internet Options, User Accounts, Backup and Restore, Date and Time, Taskbar, Start Menu, Windows Firewall, Windows Update, Devices and Printers.

Unit II


System Tools - Backup, Character Map, Clipboard Viewer, Disk Defragmenter, Drive Space, Scandisk, System Information, System Monitor, Disk Cleanup, Browsing the Web with Internet Explorer and other browsers,

Accessibility Features of Windows - Sharing Folders and Drives, Browsing the Entire Network, Using Shared Printers. OLE - Embed/Link Using Cut and Paste an Embed/ Link, Using Insert Object Manage Embedded/Linked Object.

Introduction to Word Processing (MS Word), Advantages of Word Processing, Introduction & Installation Editing a File, Working with 'options' under file menu, Formatting Tool Bar, Setting margins, orientation and size of page. Using Paragraph Styles, Formatting Text, Inserting page number, Format Painter, Spell Check & Word Count, Newspaper Style Column, Drop Cap, Header & Footer, Endnote and Footnote.

Unit III

Advanced Features of MS-Word: managing page breaks and section breaks, Inserting Objects, Inserting Hyperlink, Cross reference, Bookmark. Inserting Illustrations (Smart Art, Shapes, Charts & Pictures), Adding symbols, signature & equations, Setting Up Printer, Printing options, Inserting watermark, Mail Merge, printing labels and envelopes, Mathematical Calculations, Using Macros, Table Handling, Creating Table of Contents & Index, Use of Thesaurus, saving document versions, comparing two versions of document, protecting document.


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Unit IV

Introduction to Spread Sheet (MS Excel): Definition and Advantages of Electronic Worksheet Working on Spreadsheet, Range and Related Operations, Inserting, Deleting, Copying and Moving of Data Cells, Inserting and Deleting Rows and Columns, Protecting Cells, protecting worksheet and workbook, Printing a Worksheet, Graph Creation: Types of Graphs, Creating a Chart on Chart Sheet, Printing the Chart. Sort & Filter, Data Validation, Consolidate data, Goal seek, Data Table, Subtotal, Group & ungroup data. Freeze panes, split window, conditional formatting, inserting comment, pivot table, text to column / column to text, what-if-analysis. Importing data from access, from web and from other sources. Built in functions- mathematical, logical, text, date & time, lookup and reference. Working with 'options' under file menu.

Unit V

Introduction to MS Power Point: Elements of Power Point, Exploring Menus of Power Point, Working with Dialog Boxes, Creating presentation with Auto content Wizard, Designing Presentation: Slide Setup, Adding Text, Formatting Text, Inserting Photo Album, WordArt, Graph, Object and Picture to Slide, Inserting, deleting and duplicating slides, Adding movie and sound to slide, Adding animation to slide, Custom Animation, Slide Transition, Protecting Presentation, Printing Slides, View Slide, Outline, Slide Sorter Notes and Slides Show.

Learning Outcomes –

After studying this subject student would be able to:

- Recognize when to use each of the Microsoft Office programs to create professional and academic documents, reports, worksheets and presentations.
- Use Microsoft Office programs to create personal, academic and business documents keeping in mind prevalent professional and/or industry standards.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. Kevin Wilson, Essential Office 365 Second Edition: The Illustrated Guide to using Microsoft Office (Computer Essentials), Elluminet Press
2. R.K Taxali, P C Software for Windows.

Reference Books:

1. Lisa A. Bucki, Word 2013 Bible, Wiley
2. John Walkenbach, Excel 2013 Bible, Wiley
3. Faithe Wempen, PowerPoint 2013 Bible, Wiley

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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

Lab I (Programming skills with C++)

Max. Marks: 50

Min. Marks: 18

Suggested List of Practicals

1. Define a STUDENT class with Roll No., Name, and Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the student details.
2. Write a volume function which calculates the volume of sphere, rectangle and cylinder using function overloading.
3. Write a program to find roots of Quadratic equation, displaying the answer, whether roots are equal, real or complex..
4. Write a C++ program to demonstrate private, public and protected access specifiers.
5. Write a program to implement single and multiple level inheritance.
6. Write a C++ program to create a class called COMPLEX and implement the following overloading functions ADD that return a complex number:
 - (i) ADD(a, s2) – where 'a' is an integer (real part) and s2 is a complex number
 - (ii) ADD(s1, s2) – where s1 and s2 are complex numbers
7. Write a C++ program to create an ACCOUNT class which has a parameterized constructor for inputting values of account number, name and balance. Class should also contain three more functions-Deposit for adding amount, Withdraw for subtracting amount(if account balance is more than withdrawal amount)and Print_Details for printing the whole account details.
8. Write a C++ program to create a template function for sorting of integers and doubles.
9. Write a C++ program to create a class called STUDENT with data members Roll No., Name and Age. Using inheritance, create the classes UGSTUDENT and PGSTUDENT having fields as Semester, Fees and Stipend. Enter the data for at least 5 students. Find the semester-wise average age for all UG and PG students separately.
10. Write a program to create a file and then write some text into the file through C++ program.
11. Write a C++ program to write and read values using variables in/from file.
12. Write a C++ program to write and read object using read and write function.
13. Write a program implementing basic operation of class ios i.e. setf, unsetf, precision etc.
14. Write a program to implement I/O operations on characters. I/O operations includes inputting a string, Calculating length of the string, Storing the string in a file, fetching the stored characters from it, etc.
15. Write a program to copy the contents of one file to another.
16. Write a program to perform read/write binary I/O operation on a file (i.e. write the object of a structure/class to file).
17. Write a program to maintain elementary database of students using files.

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Lab II (Office Tools)

Max.Marks: 50

Min. Marks: 18

Suggested List of Practicals

I. System Tools & MS Word

- 1) Usage of System Tools(Backup, Character Map, Clipboard Viewer, Disk Defragmenter, Drive Space, Scandisk, System Information, System Monitor, Disk Cleanup etc.)
- 2) Printing documents with even-odd pages on both sides on a network printer.
- 3) Revision of basic tools of MS-Word.
- 4) Implementing Newspaper Style Column, Drop Cap.
- 5) Use of Header & Footer, Endnote and Footnote
- 6) Learning to manage page breaks and section breaks
- 7) Inserting Objects, Hyperlinks, Cross reference, Bookmark, Illustrations, symbols, signature & equations, watermark.
- 8) Mail Merge, printing labels and envelops, Mathematical Calculations, Using Macros.
- 9) Table Handling, Creating Table of Contents & Index.
- 10) Protecting documents.

II. MS Excel

- 1) Revision of basic formulae of MS-Excel.
- 2) Protecting cells, worksheet and workbook
- 3) Applying Sort & Filter, Data Validation, Conditional Formatting
- 4) Formulae: and, or, if, sumif, sumifs, countif, countifs
- 5) Implementing Pivot Table

III. MS PowerPoint

- 1) Adding animation to slide, Custom Animation, Slide Transition
- 2) Creation of Photo Album, with automatic transition of slides in 10 seconds with loopback on end
- 3) Creation of presentation with continuation of single audio during whole presentation(despite of slide change)
- 4) Printing using Handouts



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Post Graduate Semester Wise Syllabus

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(Session–2023-24)

M. Sc. Semester II Computer Science (for Regular Students only)

Scheme of Marks

Paper Code	Paper Title	CCE		Theory /Practical		Internal	Theory /Practical	Grand Total
		Min	Max	Min	Max			
	Data Structures and Algorithms	5	15	31	85	15	85	100
	Advanced Computer Networks	5	15	31	85	15	85	100
	Advanced RDBMS	5	15	31	85	15	85	100
	Information Storage Management	5	15	31	85	15	85	100
	Lab-I (Data Structures & Algorithms)	-	-	18	50	-	50	50
	Lab-II (Advanced RDBMS)	-	-	18	50	-	50	50
							Grand Total	500

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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

Class	:	M.Sc. Semester II
Subject	:	Computer Science
Paper	:	I
Paper Title	:	Data Structures and Algorithms
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives:

- To learn use of linear and non-linear data structures like stacks, queues, linked list, tree and graph etc.
- To introduce various techniques for representation of data in the real world.
- To learn about efficient storage mechanisms of data for easy access.
- To design and implement various basic and advanced data structures and their applications.
- To develop an understanding of protection and management of data.

Unit I

Data Representation: Introduction, Linear List, Formula Based Representation, Linked representation, Indirect Addressing, Simulating Pointers.

Arrays and Matrices: The abstract data type, Operations: traversing, insertion, deletion, searching(linear & binary search) and their algorithms, row major & column major representation. Matrices: definition and operations, Special Matrices, Sparse Matrices.

Unit II

Stacks: The Abstract Data Type, PUSH & POP operations, Array representation, Linked Representation, Applications: Post fix expression evaluation and its algorithm, transforming infix expressions into postfix expressions, its algorithm, parenthesis matching, Tower of Hanoi, Re-arranging railroad cars, Rat in a maze problem.

Queues: The Abstract Data Type, array representation, Linked Representation, Insertion and deletion algorithms, Applications, circular queue, Dequeue.

Unit III

Binary and other Trees: Trees, Binary Trees, Properties, Representation, Common Binary Tree Operation, Binary Tree Traversal, The ADT Binary Tree,

Binary Search tree, abstract data type, searching, inserting and deleting in binary search trees their algorithms, AVL Trees, Introduction to Red-Black Tree and B-Tree,

Tournament Trees: Introduction, Winner Tree, The ADT Winner Tree, Loser Tree Applications.

Priority Queues: Introduction, Linear List, Applications.

Heaps: Definition, max heap initialization, insertion/ deletion in a max heap, Applications: Heap sort, machine scheduling, Huffman codes.

Unit IV

Linked Lists: representation in memory, traversing, searching, insertion, deletion operations and their algorithms, doubly linked lists, header linked list.

Graphs: Definitions, Applications, Properties, The ADT Graph. Representation of unweighted graphs: adjacency matrix, linked adjacency lists, array adjacency list, representation of weighted graphs, Graph Search Methods: depth first search and breadth first search and their algorithms.

Unit V

The Greedy Method: Optimization Problems, The method, Applications.

Divide and Conquer: The Method, Applications: merge sort, quick sort and selection sort.

Dynamic Programming: The Method, Applications.

Learning Outcomes:

After studying this subject student would be able to:

- Choose appropriate data structure as applied to specified problem definition.
- Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Apply the concepts learnt, to various domains like DBMS, compiler construction etc.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. Sartaj Sahni, Data Structures , “Algorithms and Applications in C++”, Mc Graw Hill
2. Seymour lipschutz, “ Theory and problems of data structures”, Schaum Series.

Reference Books:

1. A.M.Tanenbaum, “Data Structures using C & C++ ”



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Class	:	M.Sc. Semester II
Subject	:	Computer Science
Paper	:	II
Paper Title	:	Advanced Computer Networks
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives -

- The objective is to make students understand the fundamental concepts in computer communications.
- To understand data communications over a data link to transfer information across different types of networks.
- To understand different topologies, state-of-the-art network protocols, architectures, and applications
- To understand the need and process of networking security.

Unit I

Introduction: Protocols and standards, Standards Organizations, Internet Standards, Internet Administration; Overview of reference models: The OSI model, TCP/IP protocol Suite, Addressing, IP versions. Connectors, Transceivers and Media converters, Network interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways.

Unit II

IPV6: Why IPV6, basic protocols, extension & option, support for QOS, Security, etc, neighbor discovery, auto- configuration, routing. Change to other protocols. Application Programming interface for IPV6. 6Bone.

Introduction to Cryptography: Basic Terms-Plain Text, Cipher Text, Encryption, Decryption, Cryptography, Cryptanalysis, Cryptology, Secret Key, Cipher Principles-Security, Attacks, Services and Mechanisms, Classical Encryption Techniques-Substitution and Transposition Techniques.

Unit III

Mobility in Network: Mobile, Security related issues, IP Multicasting, Unicast Routing Protocols – RIP, OSPF, BGP, Multicasting Routing Protocols, Host Configuration: BOOTP AND DHCP .

Unit IV

TCP extensions for high speed networks, Transaction oriented Applications, ARP, RARP, Internet Protocol, ICMP, IGMP, TCP, UDP, Introduction to Socket & Ports, Socket Class, Methods of Socket.



Unit V

Network Security at various layers, Secure-HTTP, SSL, PSP, authentication Header, Key distribution protocols, digital Signature, Digital Certificates, Firewalls.

IT Act & Cyber Laws : Cyber Crime and Cyber Laws, Types of Cyber Crimes, Cyber Law Issues in E-Business Management, Overview of Indian IT Act, Information Technology Act 2000, International Scenario in Cyber Laws: Data Protection Laws in EU and USA, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

Learning Outcomes:

After studying this subject student would be able to:

- Apply the concepts of layered architecture in assessing the placement of network devices, protocols and services.
- Compare the services provided by the UDP/TCP transport layer protocols and explain the mechanisms used to provide a reliable data transport service on an unreliable IP network.
- Analyze the application of network technologies in designated scenarios and explore how these technologies can be deployed to support the Quality of Service requirements of current and future applications.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Textbooks:

1. A. S. Tanenbaum, "Computer Networks", Pearson Education.
2. Behrouz A. Forouzan, "TCP/IP Protocol Suite", 3rd Edition, Tata McGraw Hill.

Reference Books:

1. W. Stallings, "Data and Computer Communication", Pearson Education.
2. Forouzan, "Data Communication and Networking", 2nd Edition, Tata McGraw Hill.
3. W. Stallings, "Computer Network with Internet Protocols", Pearson Education.
4. Eugene Blanchard, "Introduction to Networking and Data Communications"
5. J. Martin, "Computer Network and Distributed Data Processing", PHI.
6. P S Gill, "Cryptography and Network Security", Trinity press.
7. Sood,—Cyber Laws Simplified, Mc-Graw Hill



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Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester II		
Subject	:	Computer Science		
Paper	:	III		
Paper Title	:	Advanced RDBMS		
Compulsory/Optional	:	Compulsory		
Max. Marks	:	Theory - 85	CCE - 15	Total - 100

Course Objectives -

- To give a formal foundation on the relational model of data, understanding database architecture and life cycle.
- To present the concepts and techniques relating to query processing by SQL engines
- To introduce the concepts of transactions and transaction processing
- To present the issues and techniques relating to concurrency and recovery in multi-user database environments
- To make use of triggers, cursor and applying programming on database using PL/SQL.

Unit I

The Database Life Cycle (DBLC): Initial Study of The Database, Database Design, Implementation and Loading, Testing And Evaluation, Operations and Maintenance.

Database Administration: The Role of Database Administrator, Modeling Enterprise Data, Planning for Databases, Managing Data Security, Backing Up Databases, Controlling Concurrent Access, Managing Data Quality, Data Dictionaries and Repositories.

Unit II

Transactions: ACID properties, states of transaction, Concurrent executions, concepts of serializability and recoverability.

Concurrency control: Overview of Locking, modes of locking: shared & exclusive, 2 phase locking protocol, time stamping, Timestamp-ordering protocol, validation-based protocol, multi-versioning ,Deadlock Handling.

Recovery: transaction failure classification, stable storage implementation, log based recovery, Shadow paging, recovery with concurrent transactions, checkpoints & rollback.

Security & Integrity: security measures for protection of data at various levels, authorization, views, granting of privileges, security specifications in SQL, encryption.

Unit III

Database System architectures: Centralized systems, Client-Server Systems: Architecture And Implementation, transaction servers, data servers, Parallel systems, parallel database architectures, Distributed systems and databases : Introduction, distributed database transparency features, levels of data and process distribution: SPSD (Single site Processing, Single-site data), MPSD (Multiple Site Processing, Single-site data), MPMD (Multiple –Site Processing, Multiple- Site data). Advantages and disadvantages of distributed database systems.



Unit IV

PL/SQL: Introduction, the SQL execution environment, the PL/SQL syntax, block structure – declarative part, executable part, exception handling part, variable declaration using %type, %rowtype, if statements, looping structures, oracle transactions, cursors & its types, cursor attributes, nesting of cursors, parameterized cursors, error handling in SQL.

Concurrency control: Locks, implicit locking, levels of locks, explicit locking, select for...update statement, using lock table statement.

Unit V

Error handling: user named exception handlers for i/o validation and business rule validation. **Stored Procedures and Functions:** creating a stored procedure or function, syntax for declaration, execution and exception handling parts, advantages of using procedure or function. Deleting a procedure or function. **Database Triggers:** Introduction, use, database triggers v/s procedures, database triggers v/s declarative integrity constraints, how to apply triggers. Types of triggers, Creating a trigger, deleting trigger. User defined error messages through Raise_Application_Error Procedure.

Learning Outcomes:

After studying this subject, students will be able to:

- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on database as needed.
- Design and implement a database schema for a given problem-domain
- Normalize any database as per requirement.
- Develop a small back-end application having complete audit-trail, so that any intrusion can be identified.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database System Concepts" McGraw Hill
2. Ivan Bayross, "SQL PL/SQL: The programming language of Oracle", BPB Publications

Reference Books:

1. Rajesh Narang "Database Management System" PHI
2. C.J. Date , "An introduction to database system "
3. Bipin C. Desai, "An Introduction to Database System" .
4. Ramakrishnan Gehrke , "Database Management System".



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Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester II
Subject	:	Computer Science
Paper	:	IV
Paper Title	:	Information Storage Management
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives -

- To develop an understanding of varied components of information storage infrastructure in classic and virtual environments.
- To make students understand storage device principles including structure, host I/O processing & standards.
- To learn storage classes (JBOD, DAS, SAN, NAS, CAS), interconnection protocols, and management principles.
- To develop an insight into storage network design principles, networked storage capabilities (Snaps, mirroring, virtualization), Backup, Business Continuity, and Disaster Recovery principles

Unit I

Introduction to Storage Technology: Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data centre requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Life cycle Management concept, Data categorization within an enterprise, Storage and Regulations.

Unit II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications.

Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

Unit III

Introduction to Networked Storage: JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fiber Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.



Unit IV

Introduction to Information Availability: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

Unit V

Managing & Monitoring: Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

Learning outcomes-

Upon successful completion of the course, students should be able to:

- Identify the need for data centers, storage needs and categorizing as per requirement.
- Apply the techniques used for data maintenance in single or networked system storage.
- Identify information security requirements and provide solutions
- Understand and articulate business continuity solutions – backup and replications, along with archive for managing fixed content

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Textbook

1. Antonio Cantiago, Information Storage and Management: Storing, Managing, and Protecting Digital Information, Wiley, ISBN: 9788126521470

Reference book:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments, ISBN-13: 978-1118094839, ISBN-10: 1118094832, Wiley
2. Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, Ulf Troppens and Rainer Erkens, Wiley



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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

Lab I (Data Structures & Algorithms)

Max. Marks: 50

Min. Marks: 18

Suggested List of Practicals

1. Write a choice based menu driven program to traverse an array, insert an item at the kth position in the array and delete item at kth position from the array.
2. Write a program for matrix multiplication.
3. Write a program to find the maximum number from the given array elements
4. Write a program to implement PUSH & POP operations on a stack using array.
5. Write a program for evaluation of a postfix expression using stack
6. Write a program for conversion of infix expression into postfix expression using stack
7. Write a program for parenthesis matching of given expression using stack.
8. Write a program for selection sort.
9. Write a program for quick sort.
10. Write a program for merge sort.
11. Write a program for linear search.
12. Write a program for binary search.
13. Write a program to implement insertion and deletion operation on queue using array.
14. Write a program to implement linked list.
15. Write a program to implement binary tree.

The image shows five handwritten signatures in blue ink. From left to right: a signature that appears to be 'Anand', a signature that appears to be 'Ravi', a signature that appears to be 'Arun', a signature that appears to be 'Arjun', and a signature that appears to be 'Arjun'.

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(Session-2023-24)

Lab-II (Advanced RDBMS)

Max. Marks: 50

Min. Marks: 18

Suggested List of Practicals

1. Write a PL/SQL code to create an employee database with the tables and fields specified as below. a) Employee b) Works c) Company d) Manages Note: Primary keys are underlined.
2. Write a PL/SQL code to create a student database with the tables and fields specified as below. a) Student (Roll_no, student_name, course , gender) b) Student_personal (Roll_no,dob, fathers_name, address, city) c) Student_enrollment (Roll_no, course, course code, sem, total_marks,percentage).
3. Write a PL/SQL code to calculate the total and the percentage of marks of the students in four subjects from the table- Student with the schema given below. STUDENT (RNO , S1 , S2, S3, S4, total, percentage)
4. Write a PL/SQL code to display employee number, name and basic of 5 highest paid employees.
5. Write a PL/SQL code to calculate the total salary of first n records of emp table. The value of n is passed to cursor as parameter.
6. Write a PL/SQL code to update the salary of employees who earn less than the average salary.
7. Write a row trigger to insert the existing values of the salary table in to a new table when the salary table is updated.
8. Write a trigger on the employee table which shows the old values and new values of Ename after any updations on ename on Employee table.
9. Write a PL/SQL procedure to find the number of students in first, second, and third division respectively in each course by using database tables as described in problem 2 above . Also write the code to call your procedure.
10. Create a stored function that accepts 2 numbers and returns the addition of passed values. Also write the code to call your function.
11. Write a PL/SQL function that accepts department number and returns the total salary of the department. Also write a function to call the function.

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Sri Sathya Sai College for Women, Bhopal

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(NAAC Accredited 'A' Grade)



SYLLABUS

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SESSION- 2023-24

Class: M.Sc. Semester-III & IV

SUBJECT: Computer Science

Sri Sathya Sai College for Women, Bhopal

(An Autonomous Affiliated to Barkatullah University Bhopal)

Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

M. Sc. Semester III Computer Science (for Regular Students only)

Scheme of Marks

Paper Code	Paper Title	CCE		Theory /Practical		Internal	Theory /Practical	Grand Total
		Min	Max	Min	Max			
	Linux & Shell Programming	5	15	31	85	15	85	100
	Compiler Design	5	15	31	85	15	85	100
	Programming Skills with Java	5	15	31	85	15	85	100
	Elective – I	5	15	31	85	15	85	100
	Lab-I (Linux & Shell Scripting)	-	-	18	50	-	50	50
	Lab-II (Java Programming)	-	-	18	50	-	50	50
							Grand Total	500

Elective - I : Semester III –

- Data Warehousing and Mining
- Operations Research
- Software Engineering

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester III
Subject	:	Computer Science
Paper	:	I
Paper Title	:	Linux & Shell Programming
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To introduce the concepts of process management and synchronization.
- To learn different memory management and disk management schemes.
- To introduce basic and general purpose commands of UNIX.
- To learn the basic components required in constructing shell script.
- To learn file management and permission advance commands.

Unit I

Introduction: Definitions, functions and types of operating system, System components, Operating system Structure, System Calls, System Programs, Interrupts, Microkernel . **Process Management:** Process Concepts, Process states & Process Control Block, Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non- Preemptive) –FCFS, SJF, RR, Priority, Multiple-Processor, Real-Time, Multilevel Feedback Queue Scheduling. **Process Synchronization:** Critical Section Problem, Semaphores, Classical Problems of Synchronization and their Solutions, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Unit II

Memory Management: Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms.

File & Disk Management: Concept of File System(File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree- Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed) Disk Management: Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery, Security: Security Threats, Protection, Trusted Systems, Windows Security.

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Unit III

Linux Basics: Introduction to Linux: History, GNU Movement, System Organization (Kernel and Shell), Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open Source Software, Linux, Linux Architecture, Linux File System . Types of user-Root user(#) and normal user(\$), Multiple logins at same time(Ctrl + Alt + F1,F2..F6), Help: whatis, --help, man command, , init and run levels.
Linux Installation, touch, ls, ls -l, ls -la, mkdir, rm, rm -rf, cat, cat > file, cat >> file, cp, move, rename, rm, who. Use of /, all directories under /, absolute path & relative path. Basic calculator, date utilities.
Vi Editor : Command mode & Insert mode, cut, yank, undo.

Unit IV

Linux Administration : Managing multiple processes, changing process priority with nice, cron commands, kill, ps.
Filter Commands: tr, head, tail, last, grep, sort, piping. Find Command with various options.
Managing user accounts- Sudo, users: useradd, usermod & userdel, passwd, Group creation: Primary & Secondary Group, chgrp, chown, permissions: adding and removing permissions. Package installation through GUI/ apt-get/yum/dnf. Process, Swap, Partition, fdisk.

Unit V

Shell Programming: Types of Shells, Shell Meta Characters - \$#,\$*,\$?, Shell Variables, Shell Scripts, Debugging scripts, echo, read, operators, keywords, Integer Arithmetic and String Manipulation, Decision Making: if-else-elif-fi, case-esac. Loop Control: while, for, until, break & continue. Functions, I/O Redirection and Piping, Exception Handling.
Creating shell programs for automating tasks, file handling, trapping signals etc.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- The structure of OS and basic architectural components involved in OS design.
- The various device and resource management techniques for timesharing and distributed systems.
- Key concepts like Mutual exclusion, Deadlock detection of distributed operating system.
- Use of Unix/Linux utilities to create and manage simple file processing operations.
- Organization of directory structures with appropriate security.
- Skills to develop shell scripts to perform complex tasks.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

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Recommended Text Books :

1. Evi Nemeth , "Linux administration handbook", Pearson Publications.
2. Christopher Negus, "Linux Bible", Wiley Publications
3. Sumitabha Das, "Unix Concepts and Applications", Tata McGraw Hill Publication

Reference Books :

1. Steve Parker, "Shell Scripting: Expert Recipes for Linux, Bash and more", Wrox Publication
2. Richard Blum, Christine Breshnahan , "Linux Command Line and Shell Scripting Bible", Wiley Publications

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- Akumar
- Arjun
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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester III		
Subject	:	Computer Science		
Paper	:	II		
Paper Title	:	Compiler Design		
Compulsory/Optional	:	Compulsory		
Max. Marks	:	Theory - 85	CCE - 15	Total - 100

Course Objectives –

- To learn about the different phases of compilation.
- Understand the types and design architecture of compilers.
- The role of lexical analyzer, parser and symbol table in the compilation process .

Unit I

Introduction to finite automata, Nondeterministic Finite Automata , transition diagrams, transition tables, acceptance of input strings by automata, deterministic finite automata, conversion of NFA to DFA, construction of NFA from regular expression.

Unit II

Compilers and translators, Features of a good compiler, Interpreter, Comparison of interpreter and compiler, The structure of a compiler, Error handling, Compiler writing tools, some typical compiler structures, Bootstrapping, cross compiler, context free grammar. The formal definition of a context free grammar, Notational conventions, derivations, parse trees and derivations, ambiguity, regular grammars and regular expressions.

Unit III

Lexical Analysis : The Role of the lexical analyzer, lexical analysis versus parsing, Tokens, patterns and lexemes, Attributes for tokens, lexical errors, the need for lexical analysis, input buffering : Buffer Pairs, Sentinels, specification of tokens, Recognition of tokens.

Unit IV

Syntax Analysis : Introduction, The role of the parser, parsers, Representation of a parse tree, Parsing techniques : Bottom up parsing, shift reduce parsing, handles, handle parsing, stack implementation of shift reduce parsing, constructing a parse tree, operator precedence parsing, operator precedence relations from associativity and precedence, the operator precedence parsing algorithm. Top down parsing, elimination of left recursion, recursive descent parsing, predictive parsers.

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Unit V

Symbol Tables : The Contents of a symbol table, Names and symbol table records, reusing symbol table space, indirection in symbol table entries, storage allocation information, data structures for symbol table : Lists, search trees, /hash table errors, classification of errors, lexical and syntax errors, semantic errors, Run time errors.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- Identification of tokens.
- The design process of a compiler including its phases and components.
- Code Writing for the lexical analysis phase .

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. Affred V .Aho, Jeffery D Ullman , “Principles Of Compiler Design” , Narosa Publications
2. Affred V. Aho Ravi Sethi, Jfeery D.Ullman Ullman , “Compiler Principles, Techniques And Tools”
3. D.M. Dhamdhere , “Compiler Construction Principles & Practices”

References books:

1. John E-Hopcoft, Rajeev Motwani, Jeffery D.Ullman , “Introduction To Automata Theory, Language And Computation”
2. A.I.Holub , “Compiler Design”

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester III
Subject	:	Computer Science
Paper	:	III
Paper Title	:	Programming Skills With Java
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
- Discuss the principles of inheritance, interface and packages and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
- To understand importance of Multi-threading & different exception handling mechanisms.
- To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.
- To understand Java Swings for designing GUI applications based on MVC architecture.

Unit I

An overview of java, History and design features of java, how java works, java virtual machine (JVM) ,Java development kit(JDK) ,Java Vs C++, Data types, Variables, and constants, Arrays, Operators , Control statements- Branching, Looping and Jumping.

Object-Oriented Programming: Classes Objects, and methods: defining a class, adding variables and methods, creating objects, Constructors, Implementing & Designing Classes.

Unit II

String and string buffer classes, Wrapper classes. Inheritance, -Types of inheritance, Access specifiers, using super, method overriding. Packages and interface-, Importing package, Standard java packages. Defining and implementing interface, Extending interface, Nested interface, Multiple Inheritance. Exception handling, fundamentals, exception types, uncaught exceptions, throws, throw, try-catch, final, built in exceptions, creating your own exceptions.









Unit III

Multithreading fundamentals, java thread model: priorities, synchronization, messaging, thread class, Runnable interface. Java collections. Input/output-basics-streams, byte and character streams, predefined streams, reading and writing from console and files

Networking –basics, networking classes and interfaces, using java.net package, Sockets- doing TCP/IP and datagram programming.

Unit IV

Application Vs Applets- using the tools in JDK, javadoc, java, jdb etc.

Applets programming-creating and executing java applets, inserting applets in a web page, java security. Java Graphics fundamentals. AWT classes, event handling and swing classes, AWT programming, working with windows, graphics and text, using AWT controls, layout managers and menus, handling image, animation, sound and video. Event handling- different mechanism, the delegation event model, event classes, event listener interfaces, adapter and inner classes. Java swing applet, icons and labels, text fields, buttons, combo boxes, tabbed and scroll panes, trees, tables.

Unit V

JDBC Overview, Connection Classes and interfaces, JDBC ODBC Bridge, Servlets, Life cycle of servlet, Cookies, - RMI - Remote Method Invocation 2 tier 3 tier Architecture, Object serialization, CORBA - JINI overview.

JAVA BEANS AND SWING Bean concepts , Events in bean box - Bean customization - Persistence - Application - deployment using swing - Advanced swing techniques - JAR file handling.

Learning Outcomes –

After studying this subject, student will be able to –

- Implement Object Oriented programming concepts using basic syntax of control structures, strings and functions for developing skills of logic building activity.
- Identify classes, objects, members of a class and the relationships among them needed for finding the solution to specific problems.
- Demonstrate how to achieve reusability using inheritance, interfaces and packages and achieving faster application development.
- Understand different exception handling mechanisms and concept of multithreading for robust, faster and efficient application development.
- Develop web applications with netbeans and J2EE Technologies.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

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Recommended Text Books:

1. E.Balaguruswamy , Programming with java .
2. Schildt : Java Complete Reference TMH.
3. Deitel & Deitel , "Java How to program" , Prentice Hall.

References books:

1. Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press.
2. Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications".

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester III
Subject	:	Computer Science
Paper	:	IV (i)
Paper Title	:	Data Warehousing and Mining
Compulsory/Optional	:	Optional Elective-I
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To introduce concepts of data ware house and data mining, principles, architectures, applications, design and implementation.
- Familiarize with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining.
- Characterize the kinds of patterns that can be discovered by association rule.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Unit I

Introduction to Data warehouse: Need for strategic information, Decision support system, Knowledge discovery & decision making, , need for data warehouse, Evolution, Definition, Data warehousing Components, Data warehouses and data marts, meta data, Planning your data warehouse, Data Warehouse Architecture, Data Warehouse Backend Process: Data Extraction, Data Cleaning, Data Transformation, Data Reduction, Data loading and refreshing. ETL and Data warehouse.

Unit II

Data modeling strategies: Multi dimensional data models, Fact tables, Data Cube presentation of fact tables, Star Schema, Snowflake schema, Fact Constellation. **OLAP technology:** Characteristics, Major features and functions, drill down and roll-up, OLAP Models: MOLAP and ROLAP. Physical design consideration, Indexing, Data ware house deployment activities. **Introduction to Data Mining:** Data Mining Functionalities, Classification of Data Mining Systems, Integration of Data Mining System with a Database or Data Warehouse System Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

Unit III

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts of Association Rules, Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, Association Mining to Correlation Analysis, Constraint-Based Association Mining. Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Associative Classification, Lazy Learners, Other Classification Methods, Prediction.

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Unit IV

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

Unit V

Advanced Topics: Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- Functionality of the various data mining and data warehousing components, strengths and limitations of the models..
- The techniques of various analyzing data.
- Different methodologies used in data mining and data ware housing.
- Application of warehousing and mining with various technologies to different types of data.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. Paulraj Ponnaiah , “Data Warehousing Fundamentals”, Wiley Student Edition.
2. Jiawei Han and Micheline Kamber , “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers
3. Margaret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education.

References books:

1. Alex Berson and Stephen J. Smith —Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition,
2. K.P. Soman, Shyam Diwakar and V. Ajay , “Insight into Data mining Theory and Practice”, E E E, Prentice Hall.
3. G. K. Gupta , “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester III
Subject	:	Computer Science
Paper	:	IV (ii)
Paper Title	:	Operations Research
Compulsory/Optional	:	Optional Elective - I
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- Familiarizing the students with quantitative tools and techniques, which are frequently applied to business decision-making
- To provide a formal quantitative approach to problem solving and an intuition about situations where such an approach is appropriate.
- Introducing the fundamentals of Operations Research Models including linear programming and applications.
- To learn to construct models appropriate to particular applications, develop optimal solutions, understand the theory behind solutions and translate solutions into directives for action.

Unit I

Linear Programming Problem (LPP): Introduction to LPP, Components of LPP, Formulation of LPP, Graphical Solution of LPP, Exceptional Cases in Graphical Solution, Slack and Surplus Variable, Basic Solution, Basic Feasible Solution, Unbounded Solution, Infeasible Solution Optimal Solution, Standard and Matrix Form of LPP, Advantages, Applications and Limitation of LPP. Simplex Method, Pre Conditions of Simplex Method, Concept of Artificial Variables, Two-Phase Method, Big-M Method, Disadvantages of Big-M Method over Two-Phase Method.

Unit II

Dual Linear Programming Problem: Concept of Duality, Primal-Dual Relationship, Dual Simplex Method, Difference between Simplex and Dual Simplex Method, Advantage of duality, Revised Simplex Method, Advantages of Revised Simplex Method over Simplex. **Integer Programming Problem:** Introduction, Difference between LPP and IPP, Mixed and All Integer IPP, Gomory's Cutting Plane Method, Branch and Bound Method, Geometrical Interpretation of Branch and Bound Method.

Unit III

Transportation Problem: Introduction and Applications of Transportation Problem, Basic Feasible Solution of Transportation Problem, North-West Corner Method, Matrix Minima Method, Row Minima Method, Column Minima Method, Vogel's Approximation Method, Degeneracy in TP, Loops in TP, Optimal Solution (U-V method), Unbalanced Transportation Problem. **Assignment Problem:** Introduction and Application of Assignment Problem, Hungarian Algorithm for Assignment Problem, Maximization Case of AP, Unbalanced Assignment Problem.



Unit IV

Inventory Management: Introduction, Types of Inventories, Various Costs Involved in Inventory Decisions, Economic Order Quantity (EOQ), Determination of EOQ by Tabular Method and Graphical Method, EOQ Model without Shortage, EOQ model with Shortage, Inventory Model with Price- Break.
Replacement Problem: Concept of Replacement, Replacement without Considering Money Value, Present Worth Factor (PWF), Replacement Considering Money Value, Group Replacement.

Unit V

Queuing Theory: Introduction, Characteristics of Queuing System, Transient and Steady States, Memory-less Distribution, Exponential and Poisson Process, Markovian Property, Erlang Distribution, Distribution of Arrivals, Distribution of Service Times, Kendall's Notations, Pure Birth Process, Birth and Death Model. **Non Linear Programming Problem (NLPP):** Introduction, Graphical Solution of NLPP Kuhn-Tucker Condition, Quadratic Programming, Wolf_s Method.

Learning Outcomes –

After studying this subject, student will be able to –

- Define and formulate linear programming problems and appreciate their limitations.
- Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- Conduct and interpret post-optimal, sensitivity analysis and explain the primal-dual relationship.
- Develop mathematical skills to analyse and solve integer programming and network models arising from a wide range of applications.
- Effectively communicate ideas, explain procedures and interpret results and solutions in written and electronic forms to different audiences.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. Gillet B.E, "Introduction to Operation Research, Computer Oriented Algorithmic approach", TMH Publications.
2. P.K. Gupta & D.S. Hira, "Operations Research", S.Chand & Co Publications.
3. J.K. Sharma, "Operations Research: Theory and Applications", Mac Millan Publication.
4. S.D. Sharma, "Operations Research", Kedar Nath Ram Nath Publications.
5. S.S. Rao —Optimization Theory and Application, Wesley Eastern Publications.

References books:

1. Tata Hamdy, —Operations Research, Fifth Edition, Prentice Hall of India.
2. Taha H.A. —Operations Research --An Introduction, McMillan Publications.
3. Harvey M. Wagner, —Principles of Operations Research with Applications to Managerial Decisions, PHI.
4. Hilier and Liebermann, —Introduction to Operations Research, McGraw-Hill.
5. Wayne Winston, —Operations Research: Applications and Algorithm, Cengage.
6. Paul A. Jensen, —Operational Research Models and Methods, John Wiley.

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester III
Subject	:	Computer Science
Paper	:	IV (iii)
Paper Title	:	Software Engineering
Compulsory/Optional	:	Optional Elective - I
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To understand software development and software life cycle process and software development models and design.
- To learn methods of gathering, specifying and analyzing software requirements.
- To study Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques
- Learn software testing methods, understand software quality assurance and configuration management process.
- To understand the need of project management and risk management
- To understand project management life cycle and project scheduling concept.

Unit I

Introduction: Types of software, Software Components, Software Characteristics, Software Engineering, Scope and necessity of Software Engineering, Software Engineering Processes, Factors affecting Quality and Quantity of Software. Software Development Life Cycle (SDLC), **Software Models:** Water Fall Model, Prototype Model, RAD Model, Evolutionary Development Models (Spiral Model, Incremental Model, Concurrent Development Model)

Unit II

Software Requirement Analysis: Requirement Specifications: Need for SRS, Nature of SRS, Characteristics, Components of SRS. Requirements analysis: Review and Management of User Needs, Feasibility Study, Information Modeling, IEEE Standards for SRS, Various SRS Templates, Validation of SRS. **Software Metrics and Measurement:** Software Process and Project Metrics, Software Measurement, Cyclomatic Complexity Measures: Control Flow Graphs, Software Quality Metrics. **Software Project Planning:** Objectives, Scope, Software Cost Estimation: Decomposition Techniques: Software sizing , Problem Based Estimation, Line of Code(LOC) Vs Function Point (FP) Based Estimation, Process Based Estimation; Empirical Estimation Models: The COCOMO Model; Make/Buy Decision, Software Risk Management.







Unit III

Software Analysis & Design using both Conventional and Object Oriented approach: **Analysis:** Analysis Model, Process and various Documents. **Conventional Analysis:** Data Modeling (ER Diagram), Functional Model & Information Flow (DFDs), Behavioral Modeling, Structured Analysis, Data Dictionary. **Object Oriented Analysis:** Domain Analysis, Object Oriented approach Process (Use Case), Object-Relational Model, Object- Behavioral Model. **Design: Conventional Design:** Design Process, Principles & Concepts, and Design Model. **Object Oriented Design:** Design Issues, Design Process: System Design, Object Design. **Software Design Document:** Software Design Document & its various example templates: Data Design, Architecture Design, Interface Design & Procedural Design. **Coding:** Coding, Code Debugging, Code Verification and Code Optimization.

Unit IV

Testing, Deployment & Maintenance: Objectives of Testing, Types of Software Testing, Testing for Functionality and Performance, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suite Preparation, Levels of Testing: User, Integration, System Alpha and Beta Testing, User Acceptance of Products, Roll out of Software & Deployment Issues. What is Maintenance, Need for Maintenance, Categories of Maintenance: Corrective, Preventive, Adaptive and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering, Software Reuse.

Unit V

Introduction to Software Project Management (SPM): Software Configuration Management (SCM), Software Version Control. Software Quality Management, Software Quality Assurance (SQA), Software Reliability & Reliability Models, Clean Room Software Engineering Approach.

CASE Tools: Overview of CASE Tools Framework, Features, Advantages and Limitations of CASE Tools, Awareness about Some Commercial CASE Tools, Use and Applications.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- Various software application domains and different process models .
- Knowledge of converting requirements model into the design model and using software and interface design and engineering principles.
- SCM and SQA and different testing strategies and tactics.
- Principles of Software Project management, which will enable them to handle responsibilities of project manager.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

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Recommended Text Books :

1. R. S. Pressman, —Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. Pankaj Jalote, —Software Engineering, Wiley.
4. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, —Fundamentals of Software Engineering, PHI Publication.
5. Ian Sommerville, —Software Engineering, Addison Wesley.

References books:

1. Kassem Saleh, - “Software Engineering”, CEng age Learning.
2. Pfleeger, —Software Engineering, Macmillan Publication.
3. Stephen R. Schach, —Classical & Object Oriented Software Engineering, IRWIN.
4. James Peter, W. Pedrycz, —Software Engineering John Wiley & Sons.
5. Michael Dyer, —The Cleanroom approach to Quality Software Engineering, John Wiley & Sons.



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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.
(Session–2023-24)

Lab I: Linux and Shell Scripting

Max.Marks: 50

Min.Marks: 18

1. Linux Commands:

- mkdir
- cd
- rm, rm -f
- cp
- move
- rename
- cat, cat >, cat >>
- find command: -name, -uname, -size, -ctime, -mtime
- Search a given string in a file(grep command)
- Making group: groupadd command
- useradd with -d, -s, -c, -g, -G switch
- usermod
- userdel, groupdel
- ls, ls -l, chmod(with alphabetic or numeric permissions)
- Chown and chgrp command
- Edit Crontab file to wall message on system on particular time automatically.

2. Vi editor:

1. Create file, edit, save and quit
2. highlighting the searched term within a file
3. cut, yank, undo

3. Shell Scripting:

1. Write a shell script to print a message.
2. Write a shell script to access arguments passed on command line.
3. Write a shell script to create files with the names passed on command line.
4. Write a shell script to input number from user and display its factorial.
5. Write a shell script to input file name and create multiple directories individually for the name in the file given.
6. Write a shell script to input number from user and display whether it is prime number or not.
7. Write a shell script to list all the files in any directory given by the user
8. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory



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Lab II: Java Programming

Max.Marks: 50

Min.Marks: 18

A. Core Java Programming Lab(Using any Text editor)

1. Write a Program to find sum & average of 10 no. using arrays.
2. Find greater number between two numbers.(Using conditional operator.)
3. Find the factorial of number if number is given by user using command line argument.
4. Write a program to display grade according to the marks obtained by the student.
5. Write a program to convert the given no. of days into months & days using with classes, objects and method.
6. Write a program to convert given string into Uppercase and lowercase and get the length of string using array.
7. Create a package called “Arithmetic” that contains methods to deal all arithmetic operations. Also write a program to use the package.
8. Define an exception called “Marks out of Bound” exception that is thrown if the entered marks are greater than 100.
9. Using application of single inheritance. Write a program to Find the area of rectangle & volume of cube.
10. Develop a simple real life application to illustrate the use of multithreading.
11. Write a program using multiple inheritance calculate area and parameter of a circle
12. Write a program which takes input from keyboard and sends output to the console.

B. Advanced Java Programming Lab (Using Net Beans/Eclipse)

1. Design a web page having blue color background and white color text with title ,”student details”.
2. Design a web page having three hyperlinked text and two hyperlinked images.
3. Design a web page to create a registration form having name, address, password, gender, course, nationality, skill and CV with appropriate GUI control.
4. Write an applet program to draw a Filled Rectangle. (color = orange)
5. Write a Program in java netbeans to find whether a no. is prime or not.
6. Write a program in java netbeans to find whether a no. is even or odd.
7. Write a program in java netbeans to find area of a right-angled triangle
8. Write a program in netbeans to implement JDBC.
9. Write a program in netbeans to calculate simple interest.
10. Write a program in netbeans to accept employee data and insert into oracle table.

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Post Graduate Semester Wise Syllabus

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(Session-2023-24)

M. Sc. Semester IV Computer Science (for Regular Students only)

Scheme of Marks

Paper Code	Paper Title	CCE		Theory / Practical		Internal	Theory / practical	Grand Total
		Min	Max	Min	Max			
	Big Data Analytics	5	15	31	85	15	85	100
	Multimedia & Computer Graphics	5	15	31	85	15	85	100
	PHP & MySQL	5	15	31	85	15	85	100
	Elective - II	5	15	31	85	15	85	100
	Lab-I(Big Data Analytics)	-	-	18	50	-	50	50
	Lab-II(PHP & MySQL)	-	-	18	50	-	50	50
	Project	7	20	29	80	20	80	100
							Grand Total	600

Elective - II : Semester IV –

- Enterprise Resource Planning
- Cloud Computing
- Artificial Intelligence







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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester IV
Subject	:	Computer Science
Paper	:	I
Paper Title	:	Big Data Analytics
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To provide an overview of Big Data analytics.
- To discuss the challenges that traditional data mining algorithms face when analyzing Big Data.
- To introduce tools like Hadoop, NoSql, MapReduce - required to manage and analyze big data.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To introduce Machine Learning and its applications with R.

Unit I

Introduction to Big Data: Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce.

Unit II

Introduction to Hadoop: Hadoop Architecture, Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce- Data Serialization

Unit III

HDFS, HIVE AND HIVEQL, HBASE: HDFS-Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Unit IV

SPARK: Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Machine Learning with MLlib.

NOSQL: NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL.

Unit V

Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with Big R.

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Learning Outcomes –

After studying this subject, student will be acquainted with –

- Big data systems and the main sources of Big Data in the real world.
- Use of frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.
- Idea of Implementing several Data Intensive tasks using the Map Reduce Paradigm.
- Application of several newer algorithms for clustering, classifying and finding associations in Big Data.
- Design algorithms to analyze Big data like streams, Web Graphs and Social Media data and construct recommendation systems.
- Skills to apply the knowledge of Big Data to fully develop a BDA.

Question Paper scheme : Total marks 85

Section	Description	Marks
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
3. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
4. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
5. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.

Reference books:

1. Anand Rajaraman and Jeffrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
2. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
3. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
4. Pete Warden, “Big Data Glossary”, O’Reily, 2011.
5. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
6. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
7. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester IV
Subject	:	Computer Science
Paper	:	II
Paper Title	:	Multimedia and Computer Graphics
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To gather information of devices and techniques used for computer graphics.
- To gain the knowledge of 2D and 3D transformation.
- To learn and understand technical aspects of Multimedia Systems.
- To understand various file formats for audio, video, text and animation.
- To familiarize with animation, its uses and types.

Unit I

Devices: storage tube graphics display - raster scan displays, random scan systems, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Scan Conversion techniques, line drawing: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms. Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

Unit II

2D transformations: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line clipping algorithms, Polygon Clipping: Sutherland – Hodgeman, Weiler-Atherton algorithms.

Unit III

3D transformations: translation, rotation, scaling. Parallel & Perspective Projection, Types of Parallel & Perspective Projection. Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painters algorithm, Z-buffer algorithm. Curve generation, Bezier and B-spline methods. , Diffuse reflection, Specular reflection, Phong Shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV.

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Unit IV

Multimedia : Multimedia Terms, Multimedia Hardware, Basic tools in Multimedia, , Uses of Multimedia, Multimedia System Architecture, Text –Types ,text compression, Text file formats RTF, TIFF, hypertext and hypermedia Audio- Components of an audio system, digital audio, MPEG,MIDI, processing sound, sampling, compression, Sound cards, Audio file formats ,Audio Processing softwares.

Unit V

Video: Analog and Digital Video, Introduction to graphics accelerator cards, Introduction to AV/DV and IEEE1394 cards, Video file formats, compression standards.

Animation: Uses of Animation, Principles of Animation, Computer based animation, 2D and 3D Animation techniques, Animation file formats, Animation softwares, Compression.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- The concepts of computer graphics, system and design of algorithms.
- Techniques of clipping, two and three dimensional transformations, windowing, and shading.
- Multimedia terms, hardware and basic tools needed.
- The compression techniques and their industry standards.
- The process of sampling, MIDI AND MIDI devices.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. Donald Hearn and M.P. Becker, “Computer Graphics” ,Pearson Pub.
2. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
3. Foley Vandam, Feiner, Hughes, “Computer Graphics Principle & Practice” , Pearson Pub.
4. Sinha and Udai , "Computer Graphics", Tata McGraw Hill

Reference Books:

1. Parekh, “Principles of Multimedia”, Tata McGraw Hill
2. Prabhat k Andleigh, Kiran Thakral , “Multimedia System Design “ PHI Pub.
3. Shuman, “ Multimedia in action”.

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester IV
Subject	:	Computer Science
Paper	:	III
Paper Title	:	PHP & MySQL
Compulsory/Optional	:	Compulsory
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To develop a basic understanding of XAMPP & LAMP
- To understand PHP constructs for programming in PHP
- To be able to embed PHP in web pages
- To manage state in PHP
- To Explore programs of PHP with MySQL connection for database handling

Unit I

BASICS OF PHP: Introduction to PHP, what does PHP Do?, Object Oriented Programming with PHP, language basics, installation of XAMPP/LAMP, syntax, comments, variables, constants and data types, expressions and operators, flow control statements, including html code in PHP, embedding PHP in web pages.

Unit II

FUNCTIONS & STRINGS: Defining a function, Calling a function, variable scope, function parameters, return values, predefined functions.

Strings: Creating & accessing string, searching and replacing strings, encoding and escaping, comparing strings, formatting strings, regular expression.

Unit III

Data & File Handling: PHP Forms: \$_GET, \$_POST, \$_REQUEST, \$_FILES, \$_SERVER, \$GLOBALS, \$_ENV, input/output controls, validation, Cookies and Sessions.

File Handling: File and directory, open, close, read, write, append, delete, uploading and downloading files. File exists, File Size, Rename. Reading and display all/selected files present in a directory.

Unit IV

MYSQL AN OVERVIEW: Introduction, phpMyAdmin, Entering queries, Creating and using a database, Creating and selecting a database, creating a table, loading data into a table, Retrieving information from a table, selecting all data, selecting particular rows, selecting particular columns, sorting, date, calculations, working with NULL values, pattern matching, counting rows, using more than one tables.

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Unit V

MYSQL DATABASES IN PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data and deleting data through front end. Designing applications using PHP & MySQL.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- Usage of server-side scripting
- Concept of data persistence
- Skills to program logic using PHP and handle data using MySQL
- Sound Knowledge of PHP & MySQL required to develop Dynamic Websites.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books:

1. PHP & MySQL, Vikram Vaswani, McGraw-Hill
2. The Complete Reference - PHP, Steven Holzner, McGraw-Hill
3. The Complete Reference – MySQL, Vikram Vaswani, McGraw-Hill

Reference Books:

1. Beginning PHP 5.3, Matt Doyle, Wrox Publication
2. PHP for the Web covers PHP5 & 7, Larry Ullman
3. Programming PHP, Rasmus Lerdorf, Kevin Tatroe, Bob Kaehms, Ric McGredy, O'REILLY.
4. "PHP 5 Recipes, A problem solution approach", Lee Babin, Nathan A. Good, Frank M. Kromann, and John Stephens, A Press.

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Sri Sathya Sai College for Women, Bhopal

(An Autonomous Affiliated to Barkatullah University Bhopal)

Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester IV
Subject	:	Computer Science
Paper	:	IV (i)
Paper Title	:	Enterprise Resource Planning
Compulsory/Optional	:	Optional Elective - II
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- Provide basic concepts of ERP systems for manufacturing or service companies, and the difference between MRP and ERP systems.
- Learn to apply the principles of ERP systems, their major components, and the relationships among these components.
- Equip students with the knowledge of typical ERP systems, and the advantages and limitations of implementing ERP systems.
- To comprehend the technical aspects of ERP systems
- To be able to map business processes using ERP concepts and techniques.

Unit I

History of ERP, Concept of ERP System, Reasons to go for ERP, Need of ERP, Evolution of ERP, Structure of ERP, Concept of Material Requirement Planning (MRP), Manufacturing Resource Planning (MRP II), Common Misconceptions about ERP, Benefits of ERP, Disadvantages of ERP, ERP and Related Technologies, MIS (Management Information System), DSS (Decision Support System), EIS (Executive Information System), Data Warehouse, Data Mining.

Unit II

BPR (Business Process Reengineering), How ERP is related with BPR, Barriers to the Success of BPR; Role and Importance of Data Warehouse in ERP, Role of Data Mining in ERP; Supply Chain Management (SCM), Evolution and Components of SCM, Characteristics of SCM, How ERP is related with SCM; Role and Need of Customer Relationship Management, Integration of ERP, SCM and CRM.

Unit III

ERP Modules, Finance, Plant Maintenance, Quality Management, Material Management; Domain of ERP as well as areas affected by ERP e.g. Aerospace, Automobiles etc.; Market Players SAP, JD Edwards, BANN, PeopleSoft, Oracle Etc., ERP market in Indian Context; Assemble-To-Order, Make-To-Order, Just in Time (JIT); Hidden Costs involved in ERP Implementation, Planning and Project Management, Training, Data Conversion, Dirty Data, Integration Testing, Data Analysis.



Unit IV

ERP Implementation Lifecycle, Evaluation Criteria for ERP Product, Integrating ERP into organizational Culture, Critical Factors in the Success and Failure of ERP, ERP Success inhibitors, Return On Investment of ERP Implementation, Useful Guidelines for ERP Implementation, Role of Vendors in ERP Implementation, Evaluation Criteria for Vendors, Role and Need of ERP Consultants, Role of End Users in ERP Implementation, Training of End Users, Motivation for End Users.

Unit V

ERP and Internet, ERP and E-Commerce, How ERP interoperate E-Commerce, Future Directions in ERP, New Evolving Markets, Faster Implementation Methodologies, New Business Segments, Concept of Extended ERP, e-ERP, e-CRM, e-SCM, Case Study on SAP, ORACLE, People Soft etc.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- Classification of different processes of the organization and relationship among all processes.
- Examining systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components,
- Generic Model of ERP and General ERP Implementation Methodology.
- Applying the concepts of BPR, SCM and CRM.
- Knowledge of SAP and Oracle Apps.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. Alexis Leon, 'Enterprise Resource Planning Demystified', TMH Publishing Company Ltd.
2. Mahadeo Jaiswal and Ganesh Vanapalli, 'Text Book of Enterprise Resource Planning', Macmillan India Ltd.
3. Vinod Kumar Garg and N.K. Venkitakrishnan, 'Enterprise Resource Planning– Concepts and Practice', PHI.

Reference Books:

1. Rahul V. Altekar, 'Enterprisewide Resource Planning', Tata McGraw Hill.
2. Joseph A Brady, Ellen F Monk, Bret Wagner, 'Concepts in Enterprise Resource Planning', Thompson Course Technology.
3. Mary Summer, 'Enterprise Resource Planning', Pearson Education.

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Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester IV
Subject	:	Computer Science
Paper	:	IV (ii)
Paper Title	:	Cloud Computing
Compulsory/Optional	:	Optional Elective - II
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- Basics of cloud computing.
- Key concepts of virtualization.
- Different Cloud Computing services
- Cloud Implementation, Programming and Mobile cloud computing
- Key components of Amazon Web Services
- Cloud Backup and solutions.

Unit I

Cloud Computing Basics: What Is Cloud Computing? Cloud Components, Infrastructure, characteristics of cloud computing, Services & Applications-Storage, Database Services, Intranets and the Cloud -Components, Hypervisor Applications, First Movers in the Cloud –Amazon, Google, Microsoft. Benefits, Limitations. Types of cloud (public, private, community and hybrid cloud), Pros and Cons of Cloud Computing

Unit II

Cloud Computing Services: Software as a Service: The Basics , Storage as a Service , Providers, Security, Reliability, Advantages, Cautions, Outages, Theft , Cloud Storage Providers. Platform as a Service: Accessing the Cloud Platforms - Web Application Framework , Web Hosting Service , Proprietary Methods , Web Applications, Web APIs , Web Browsers -Internet Explorer, Firefox, Safari, Chrome. Infrastructure as a Service: Advantages, Software Considerations, Vendor Advantages, Limitations, Driving Forces-Popularity. Database as a Service, Monitoring as a Service, Communication as services.

Unit III

Collaborating with cloud : Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework. Collaborating on Calendars, Schedules and Task Management, Collaborating on Event Management, Contact Management, Project Management, Collaborating on Word Processing, Databases, Storing and Sharing Files, Collaborating via Web-Based Communication Tools, Evaluating Web Mail Services, collaborating via Social Networks, Collaborating via Blogs and Wikis.

Unit IV

Virtualization for cloud : Need for Virtualization, Pros and cons of Virtualization, Virtualization Concerns, Security aspects of Virtualization, Types of Virtualization – System Vm, Process VM, Virtual Machine monitor, Virtual machine properties, Interpretation and binary translation, HLL VM, Hypervisors, Xen, KVM , VMWare, Virtual Box, Hyper-V.

Unit V

Security, standards, and applications: Security in Cloud Computing, The Open Cloud Consortium, Security Management Standards: Standards for application Developers, Standards for Messaging, Standards for Security, cloud security challenges, Availability Management in SaaS, PaaS and IaaS. Access Control , Security Vulnerability, Patch, and Configuration Management, Conclusion and the future scope of the Cloud-Analyst Predictions , Survey Says?, The Future of Security in Cloud Computing. Relevant Case Studies

Learning Outcomes –

After studying this subject, student will be able to –

- Define Cloud Computing and memorize the different Cloud service and deployment models
- Describe importance of virtualization along with their technologies.
- Use and Examine different cloud computing services
- Understand Mobile Cloud Computing
- Design & develop backup strategies for cloud data based on features.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50

Recommended Text Books :

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz “Cloud Computing for Dummies” (Wiley India Edition)
2. John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and Strategy”, CRC Press
3. Antohy T Velte ,Cloud Computing : “ A Practical Approach”, McGraw Hill
4. Michael Miller, Cloud Computing: “Web-Based Applications That Change the Way You Work and Collaborate Online”
5. James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers

Reference Books:

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter—Cloud Computing : A Practical Approach.
2. B.Furht; A. Escalante —Handbook of cloud computing.
3. Majd F. Sakr —Introduction to Cloud Computing.
4. Tim Mather, Subra Kumarswamy, Shaheed Latif—Cloud Security and Privacy.



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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Class	:	M.Sc. Semester IV
Subject	:	Computer Science
Paper	:	IV (iii)
Paper Title	:	Artificial Intelligence
Compulsory/Optional	:	Optional Elective - II
Max. Marks	:	Theory - 85 CCE - 15 Total - 100

Course Objectives –

- To introduce the concepts of a Rational Intelligent Agent and the different types of agents that can be designed to solve problems
- To review the different stages of development of the AI field from human like behavior to Rational Agents.
- To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.
- To create an understanding of the basic issues of knowledge representation and Logic and blind and heuristic search, as well as an understanding of other topics such as minimal, resolution etc. that play an important role in AI programs.

Unit I

Scope of AI: Games, Theorem Proving, Natural Language Processing, Vision And Speech, Processing, Robotics, Expert Systems, General Issues and Overview of AI, AI Techniques, AI Problems. **Intelligent Agents:** Definitions of A Rational Agent, Reflex, Model-Based, Goal-Based, And Utility-Based Agents, The Environment In Which A Particular Agent Operates. **Problem Solving :** State Space Search; Production Systems, Search Space Control; **Uninformed Search:** Depth-First, Breadth-first search. **Introduction to LISP:** Syntax and Numeric Functions, Basic List, Manipulation Functions in LISP

Unit II

Informed /Heuristic Search: Heuristic Search, Hill Climbing, Best-First Search, A*, AO* Search, Branch And Bound, Problem Reduction, Constraint Satisfaction End, Means-End Analysis. **Knowledge Representation:** Predicate Logic: Unification, Modus Ponens, Resolution In Predicate Logic, Conflict Resolution Forward Chaining, Backward Chaining, Declarative And Procedural Representation, Rule Based Systems **LISP (Continued):** Functions, Predicates And Conditionals, Input, Output, And Local Variables, Iteration And Recursion, Property Lists And Arrays.



Unit III

Structured Knowledge Representation: Semantic Nets: Slots, Exceptions And Default Frames, Conceptual Dependency, Scripts. **Game Playing:** Game Tree, Minimax Algorithm, Alpha Beta Cutoff, Modified Minimax Algorithm.

Introduction To PROLOG: List, Operators, Arithmetic, Objects, Relationships, Facts, Rules And Variables.

Unit IV

Natural Languages and NLP, Syntactic Processing, Parsing Techniques, Semantic Analysis, Case Grammar, Augmented Transition. **Handling Inconsistent And Incomplete Knowledge:** Truth Maintenance Systems, Reasoning Techniques, Concept of Uncertainty, Baye's Theorem, Certainty Factors And Rule-Based Systems, Bayesian Networks, Dempster-Shafter Theory, Fuzzy Logic: Fuzzy Sets, Fuzzy Operators & Arithmetic, Membership Functions, Fuzzy Relations

PROLOG: Syntax and Data Structures, Representing Objects & Relationships By Using —Trees And —Lists, Cut & Fail, Backtracking.

Unit V

Learning: Concept of Learning, Learning Automation, Rote Learning, Genetic Algorithm, Learning By Inductions, Artificial Neural Nets, **Expert Systems:** Need and Justification for Expert Systems, Knowledge Acquisition.

AI: Present and Future.

Case Studies: Mycin, Black Board System.

Learning Outcomes –

After studying this subject, student will be acquainted with –

- Knowledge of the building blocks of AI as presented in terms of intelligent agents.
- Problems as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
- Development of intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
- Skills to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
- Formulating and solving problems with uncertain information using Bayesian approaches.

Question Paper scheme : Total marks 85

<u>Section</u>	<u>Description</u>	<u>Marks</u>
Section A	10 MCQ (1 marks each) 1 from each unit	10
Section B	5 Short answer type questions from each unit with internal choice (5 marks each)	25
Section C	5 Long answer type questions from each unit with internal choice (10 marks each)	50



Recommended Text Books:

1. S. Russell and P. Norvig, —Artificial Intelligence: A Modern Approach (2nd ed.), Pearson Education.
2. Elaine Rich and Kelvin Knight, —Artificial Intelligence, Tata McGraw Hill.
3. Eugene Charniak and Drew McDermott, —Introduction to Artificial Intelligence, PE.
4. Nils J. Nilson, —Principles of Artificial Intelligence, Narosa Publishing House.
5. R. Akerkar, —Introduction to Artificial Intelligence, Prentice-Hall of India.

Reference Books:

1. Dan W. Patterson, —Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India, 2006.
2. Nils J Nilson, —Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publishers, Inc., San Francisco, California, 2000.
3. Clocksin and C.S. Mellish, —Programming in PROLOG, Narosa Publishing House, 2002. 9. Saroj Kaushik, —Logic and Prolog Programming, New Age International Publisher, 2006
4. R. J. Schalkoff, —Artificial Intelligence-an Engineering Approach, McGraw Hill Singapore, International Editions, 1992.
5. George F. Luger, —Artificial Intelligence-Structures and Strategies For Complex Problem Solving, Pearson Education, 5th Edition, 2010

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Sri Sathya Sai College for Women, Bhopal

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Department of Higher Education, Govt. of M.P.

Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Lab I (Big Data Analytics)

Max.Marks: 50

Min.Marks: 18

Suggested list of Practicals

1. Setting up a multi-node Apache Hadoop cluster from scratch
2. Performing file I/O using HDFS.
3. Implementing an end-to-end data pipeline with Hive
4. Creating User Defined Functions in Hive
5. Working with HBase Shell and loading data from Hive
6. Running a Map/ Reduce Job - Word Count
7. Using Eclipse to build Map/Reduce Applications
8. Deploying Map/Reduce Jobs on Cluster
9. Analyzing Stock Market Data using Pig/Latin
10. Working With Complex Data Types
11. Analyzing weather data using Hive
12. Working with Hbase Shell
13. Loading Data in HDFS, Hive & Hbase in Various formats

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Post Graduate Semester Wise Syllabus

As recommended by Central Board of Studies and approved by the Governor of M. P.

(Session–2023-24)

Lab II (PHP & MySQL)

Max.Marks: 50

Min.Marks: 18

Suggested list of Practicals

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
2. Write a PHP script to demonstrate arithmetic operators, comparison operator, and logical operator.
3. Write PHP Script to input marks, generate result and display grade.
4. Write PHP Script for addition of two 2x2 matrices.
5. Write PHP script to obtain factorial of a number using function
6. Write PHP script to demonstrate string, date and math function.
7. Write PHP script to demonstrate
8. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
9. Write two different PHP script to demonstrate passing variables through a URL.
10. Write two different PHP script to demonstrate passing variables with sessions.
11. Write PHP script to demonstrate passing variables with cookies.
12. Write a program to keep track of how many times a visitor has loaded the page.
13. Write PHP script to demonstrate exceptional handling.
14. Write a PHP script to connect MySQL server from your website.
15. Write a program to read customer information like cust_no, cust_name, Item_purchase, and mob_no, from customer table and display all these information in table format on output screen.
16. Write a program to edit name of customer to “Bob” with cust_no =1, and to delete record with cust_no=3.
17. Write a program to read employee information like emp_no, emp_name, designation and salary from EMP table and display all this information using table format.
18. Create a dynamic web site using PHP and MySQL.

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Project : Application Development using any/all technologies learnt during the course

Max.Marks: 100

Min.Marks: 36

Recommendation: The technology to be used for Project Development to be revised every 2 yrs . as per the prevailing trends and needs of the industry/market.

GUIDELINES for Project Development.

- **Internal Evaluation (CCE) will be based on viva on project synopsis ((i.) System study and system design, (ii.) Presentation) submitted by the student – 20 marks.**
 - **External Evaluation will be based on , Viva and demonstration of the work done in the project– 80 marks**
1. Project will consist of software development taken up in a group consisting of not more than 2 students.
 2. Report will be submitted jointly by the group in one copy.
 3. Project can be done either as on-the-job training in a software development organization/company or it can be a self effort as a suitable solution to a real world problem identified in consultation with guide teacher.

GUIDELINES FOR PROJECT FORMULATION

* TYPE OF PROJECT

It is **suggested** that the project to be chosen should have some direct relevance to the real world. Students are expected to work out a solution for real life problems involving diverse application domains in some industry / development laboratories / educational institutions / software companies. However, it is not mandatory for a student to work on a live project. The student can formulate or innovate a project problem with the help of his/her Guide.

The project work will give an opportunity to the students to develop quality software solutions. Project development should involve all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. The primary emphasis of the



project work is to understand and gain the knowledge of the principles of software engineering practices, and develop good understanding of SDLC.

Project Ethics to be adhered to: Plagiarism to be avoided: The project should be genuine and original in nature and should not be copied from anywhere . Students should be encouraged to work in the suggested areas listed at the end of the guidelines.

***Calendar For The Project**

Sr. No.	Topic	Date
1	Assigning of teacher guide	Before 15 th January
2	Topic Finalized	Before 31 st January
3	Submission Of the Project Abstract And Synopsis (CCE 1)	Before 10 th February
4	PPT Presentation (CCE 2)	Before 20 th February
5	First proof of the Project Report to be checked by teacher guide	Before 20 th March
6	Final Submission and Viva/demonstration by external examiner	3rd week of April

*** PROJECT PROPOSAL (SYNOPSIS)**

The project proposal should be prepared in consultation with the mentor in organisation / teacher guide. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. The project proposal should contain complete details in the following form:

1. Title of the Project
2. Introduction and Objectives of the Project
3. Relevance of the topic for the benefit of the society
4. Analysis :(DFDs at least up to second level , ER Diagrams/ Class Diagrams/ Database Design etc. as per the project requirements).
5. Design: A complete structure which includes: Number of modules and purpose of each module to provide an estimation of the student's effort on the project. Data Structures as per the project requirements for all the modules.
6. Testing process to be used.
7. Reports generation (Mention tentative content of report)
8. Tools / Platform, Hardware and Software Requirement specifications
9. Are you doing this project for any Industry/Client? Mention Yes/No. If Yes, Mention the Name and Address of the Industry or Client
10. Future scope and further enhancement of the project.

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Incomplete project proposals in any respect should be given another chance and re-submitted after incorporating changes and suggestions given by the guide. CCE marks to be given based on synopsis viva.

*** PROJECT REPORT FORMULATION**

I. The project report must contain the following in detail :

1. Certificate from the organization where project has been undertaken.
2. Certificate of Originality (Format given).
3. Declaration(Format given).
4. Acknowledgement (Format given).
5. Introduction
4. Objectives
5. Tools/Environment Used
6. Analysis Document (This should include SRS in proper structure based on Software Engineering concepts, E-R diagrams/Class diagrams/any related diagrams (if the former are not applicable), Data flow diagrams/other similar diagrams (if the former is not applicable), Data dictionary)
7. Design Document (Modularization details, Data integrity & constraints including database design, Procedural design, User interface design)
8. Program Description (Detailed specification instead of code), Comments & Description.)
9. Testing (Test case designs are to be included separately for Unit testing, Integration testing, System testing; Reports of the outcome of Unit testing, Integration testing, System testing are to be included separately. Also, details of debugging and code improvement are to be included.)
10. Input and Output Screens
11. Implementation of Security for the Software developed (In case, you have set up a User Name and Password for your software, you should ensure the security of User Name and Password during transmission to server)
12. Limitations, future scope for improvement/enhancement of the Project
13. Application of the project mentioning benefit to the real world
14. Bibliography/ References
15. Synopsis

II. The Project Report may not be more than 80 1.5mm spaced A-4 size typed pages .

III. Executable file of the project must be submitted in soft copy attached at the back of the project report.

IV. The project report should be hard bound; should consist of a Contents page; all pages of report should be numbered; content should be well organized in a meaningful manner; printouts of text & screen layouts should be original and should not be xeroxed)

***Important Points For Preparation & Submission of the Project Report**



1. The Project Report should be submitted in A-4 size typed in 1.5mm line space, justified. (Font Times New Roman, size normal 12 , Heading 16 and Subheading 14)
2. The length of the report should be between 50 to 80 pages including the cover page, summary, table of contents, list of figures, list of tables, and acknowledgement.
3. Ensure that Project Synopsis and the final report contain the signatures of both the Guide and the student along with date.
4. If any project report is received in the absence of the items listed above, it will be rejected and returned to students for compliance. Also, violation of Project Guidelines may lead to rejection of the Project .
5. Spiral bound photocopy of the project report is to be submitted to the College. Original copy of the same Project Report is to be retained with the student and the student is supposed to carry his copy while appearing for viva voce.
6. If the title and content of the Project differs from the title mentioned in the Project Proposal, the Project Report should be rejected by the external examiner and valuation to be done accordingly.

***Suggested list of topics for Application Development**

A sample list of topics for Project development is provided below. This is just a suggested list and students are free to choose any other innovative project relevant to computer applications **which can be developed using any technology learned during the course.**

- Customer Targeted E-Commerce
- Automated Faculty Evaluation System
- Online Health Shopping Portal With Product Recommendation
- College Forums with Alumni With Content Filtering
- Sql Injection Prevention System
- College Social Network Project
- ERP System
- Online Book Recommendation Using Collaborative Filtering
- Monitoring Suspicious Discussions On Online Forums
- Fake Product Review Monitoring & Removal For Genuine Ratings
- A Commodity Search System For Online Shopping Using Web Mining
- Secure Online Auction System
- Farming Assistance Web Service
- Online Loan Application & Verification System
- Matrimonial Portal

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- Online Herbs Shopping Project
- Online Bakery Shop System
- Course Material Distribution System
- Online Furniture Shop Project
- Hotel Room Comparison System Project
- Salon management System
- Sports Club Management Project
- Online Blood Bank Project
- Stationery Management System
- Online Application for the Training and Placement
- Online Leave Management System
- Airline Reservation System
- Recipe Management System
- Complaint Management System
- Web Based Meeting Scheduler
- Student Project Allocation And Management
- Ticket Reservation System
- Content Management System
- Call Center Management
- Online On-Request Courses Coordination System
- Civil Registry
- Online Career Guidance and Placement Unit
- Ad Agency
- Any other approved topic

*** Formats of certificates to be included**

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A. Cover page:

PROJECT REPORT
On
<Project Title>

SUBMITTED TO
Sri Sathya Sai College for Women, Bhopal

<logo of university/College>

**IN PARTIAL FULLFILLMENT
OF THE DEGREE OF
MASTER of SCIENCE IN Computer Science
Session < >**


By

Name :
Roll No :
Enrollment No.....

Under the
Guidance of

<Name of Internal Guide> <Designation >	< Name of External Guide> <Designation>
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B. Certificate from the organization : (to be issued by the organization and the photocopy of the certificate is to be attached in the report)



C. Format for acknowledgement

ACKNOWLEDGEMENT

I convey my sincere gratitude to _____ for giving me the opportunity to prepare my project work in _____. I express my sincere thanks to all the staff members of _____.

I am thankful to _____ for her/his guidance during my project work and sparing her/his valuable time for the same.

I express my sincere obligation and thanks to the Principal and all Faculties of the Department of _____, _____, for providing me with guidance, help, motivation and valuable advice at every stage for completing the project work successfully.

Signature:

Name:

Roll No:

D. Format for Declaration

DECLARATION

I do hereby declare that the project work entitled “_____” submitted by me for the partial fulfillment of the requirement for the award of Master of Science in Computer Science, is an authentic work completed by me. The report being submitted has not been submitted earlier for the award of any degree or diploma to any Institute or University.

Date:

Signature :

Name:

Roll No:

E. Certificate of Originality

The block contains five handwritten signatures in blue ink. The signatures are: 'Arde' (top left), 'Akumar' (middle left), 'A' (bottom right), and two other illegible signatures (top right and middle right).

CERTIFICATE OF ORIGINALITY

This is to certify that the project report entitled _____ Submitted to Sri Sathya Sai College for Women, affiliated to Barkatullah University, Bhopal, in partial fulfillment of the requirement for the award of the degree of Master of Science in Computer Science, is an original work carried out by Mr./ Ms. _____ .Enrollment No.: _____ Roll.No.....

The matter embodied in this project is a genuine work done by the student and has not been submitted whether to this University or to any other University / Institute for the fulfillment of the requirement of any course of study.

Signature of the Guide

Name, Designation and
Address of the Guide

